CS9900F

SERVICE MANUAL

Canon

CANOSCAN 9900F

SERVICE MANUAL

REVISION 0

CanoScan 9900F		
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Canon

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I. SPECIFICATIONS

Scanner Main Unit

Type	: Flatbed image scanner

Scanning Part

Image sensor	: 14,240-pixel 6-line CCD
Light source	: Cold cathode fluorescent lamp
Document type	: Sheet, Book
Document alignment position	: Right-end corner
Max. document size	: A4/Letter size (216 x 297mm)
Image output mode	: Color 16-bit/ 8-bit for RGB each Grayscale 16-bit/ 8-bit
Optical resolution	: 3200 dpi x 6400 dpi

Scanning time :

	USB2.0/IEEE1394	USB1.1
upto 200dpi	2.16	2.16
upto 400dpi	2.16	4.32
upto 800dpi	4.32	8.64
over 801dpi	8.64	17.28

(msec/ line)

Film Scanning Part

Film type	: Color and monochrome, negative and positive
Film size	: 35mm sleeve (6 frames x 8) 35mm slide mount (24 frames) Brownie 4X 5 inch
Light source	: Cold cathode fluorescent lamp IR LED (for FARE function)
Scanning time	: USB2.0/IEEE1394:2.16-138.24msec/line USB1.1:2.16-146.88ms/line (automatically selected depending on films)

Interface Part

Interface	: USB connector (Universal Serial Bus 2.0) IEEE-1394 connector Power connector (for AC adapter) FAU connector (6-pin)

Front Panel

Scanner button	: 4 buttons (COPY, SCAN, FILE, E-MAIL) on the scanner unit

Others

Operating environment	: Temperature : 10 to 35 degrees Relative humidity : 10 to 90%RH Air pressure : 613 to 1013 hPa
Power source	: 100V to 120V 220V to 240V
Power consumption	: 21W max. (during operation) 8W (during standby)
Dimensions	: 290.0 (Width) x 509.0 (Depth) x 127.3 (Height) mm
Weight	: Approximately 5.3kg

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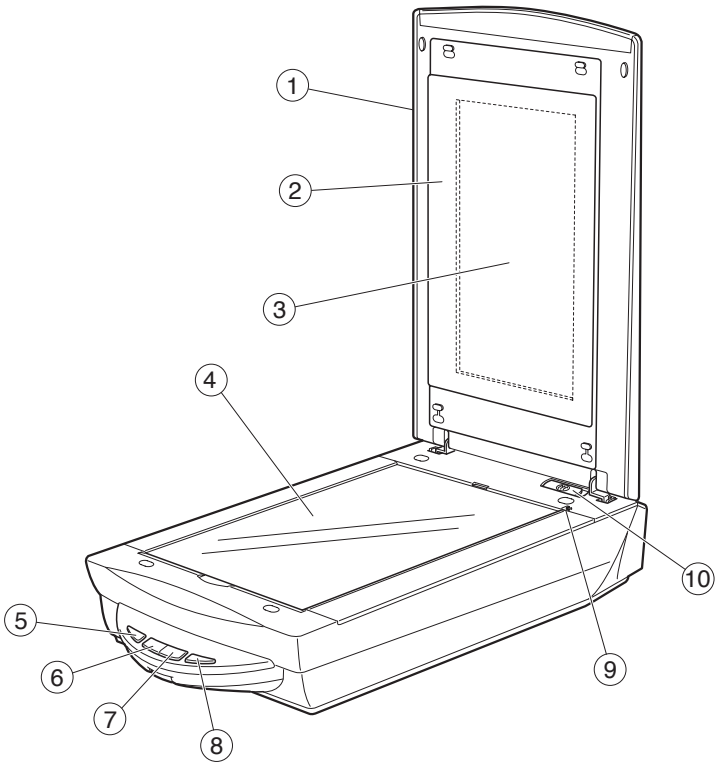
II. PARTS CONFIGURATION

A. Front View



① Document Cover
② Protective Sheet
③ Film Adapter Unit
④ Document Glass
⑤ COPY Button
⑥ SCAN Button
⑦ FILE Button
⑧ E-MAIL Button
⑨ Alignment Mark
⑩ Lock Switch

Figure 1-1

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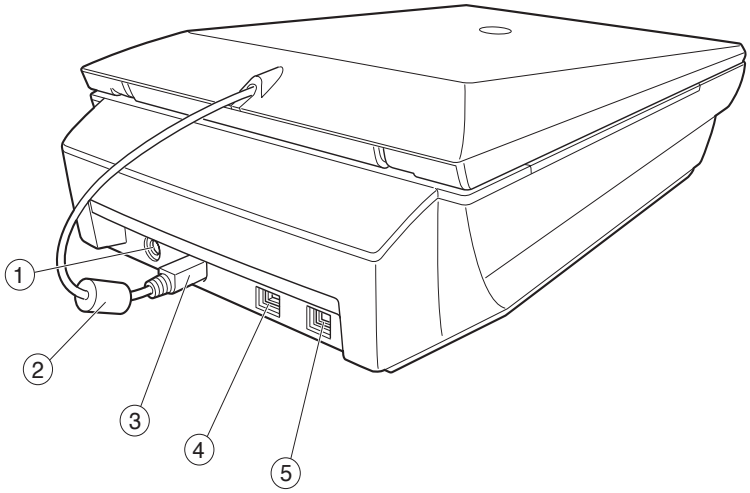
B. Back View



① Power Connector
② FAU Cable
③ FAU Connector
④ IEEE-1394 Connector
⑤ USB Connector

Figure 1-2

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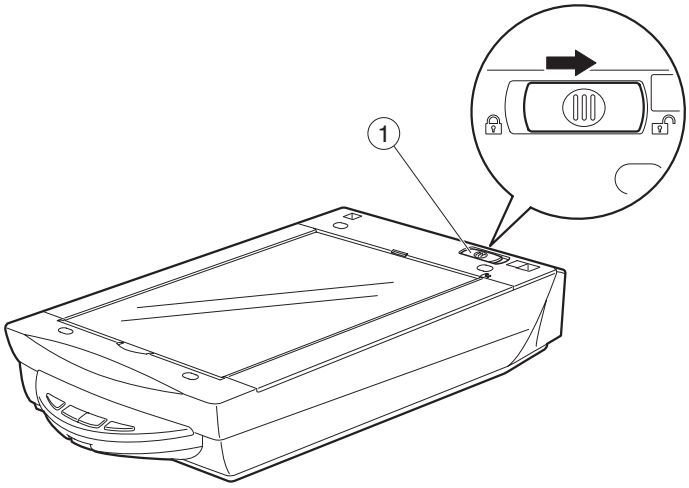
III. SETTING UP THE SCANNER

A. Precautions

* Keep the scanner out of direct sunlight. Direct exposure to the sunlight or excessive heat may cause damage to the scanner.
* Do not install the scanner in a humid or dusty environment.
* Use supplied AC adapter only.
* Place the scanner on an even and flat surface. Tilted or uneven surface may cause a mechanical problem.
* Keep the outer carton and packing material for future shipment.

B. Unlocking the Lock Switch

Scanning unit is locked by the lock switch to prevent a damage during transport. Unlock the lock switch by pushing it toward the “unlock” mark to use the scanner.



① Lock Switch

Figure 1-3

Note : Ensure to lock the lock switch during transport.

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C. Connecting Cables

CanoScan 9900F needs to be connected to the USB port on the host computer. For details, refer to the "Quick Start Guide" that comes with the product. As for connecting the host computer's cables to the scanner, refer to the host computer' manual.

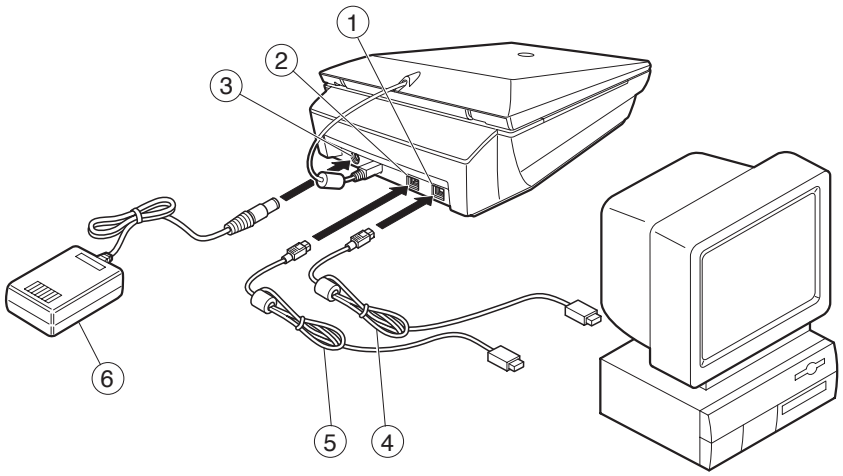
Note: Install the device driver before connecting the cables.

1. Connecting FAU Cable, USB Cable, IEEE 1394 Cable and AC Adapter Cable

1) Connect the FAU cable to the FAU connector.
2) Connect the scanner with the host compter by either USB Cable or IEEE1394 Cable.

Note: IEEE1394 Cable is not included. Use recommended cables.

3) Connect the AC adapter cable to the power connector on the scanner.



① USB Connector
② IEEE-1394 Connector
③ Power Connector
④ USB Cable
⑤ IEEE-1394 Cable
⑥ AC Adapter

Figure 1-4

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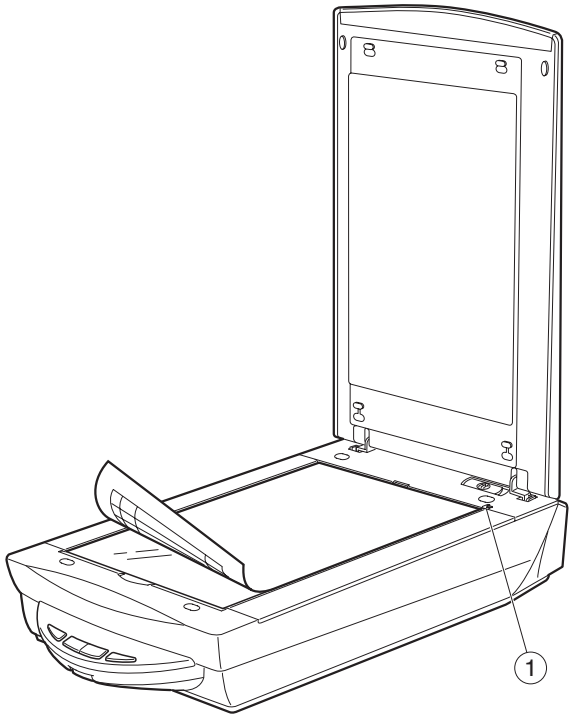
D. Scanning

1. Scanning Original

1) Place an original face-down on the document glass by aligning its top edge with the alignment mark.



① Alignment Mark

Figure 1-5

2) Close the document cover without moving the original.
3) Send the scan command from the host computer.

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2. Scanning Film

1) Slide the protective sheet up and remove it from the document cover.

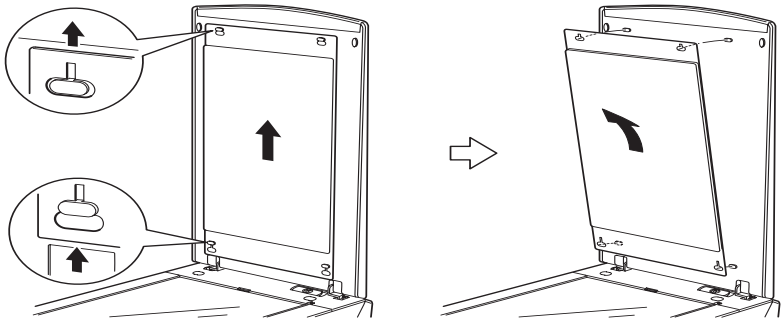

Figure 1-6

2) Insert the film into the film guide.
* Film strips
Open the film holder on the film guide for film strips, insert the strip(s) face-down into the guide and close the film holder.
* Slides
Place a slide face down in the film guide for slides.
* Open the film holder on the film guide for Brownie and 4X 5 inch, insert the strip(s) face-down into the guide and close the film holder.

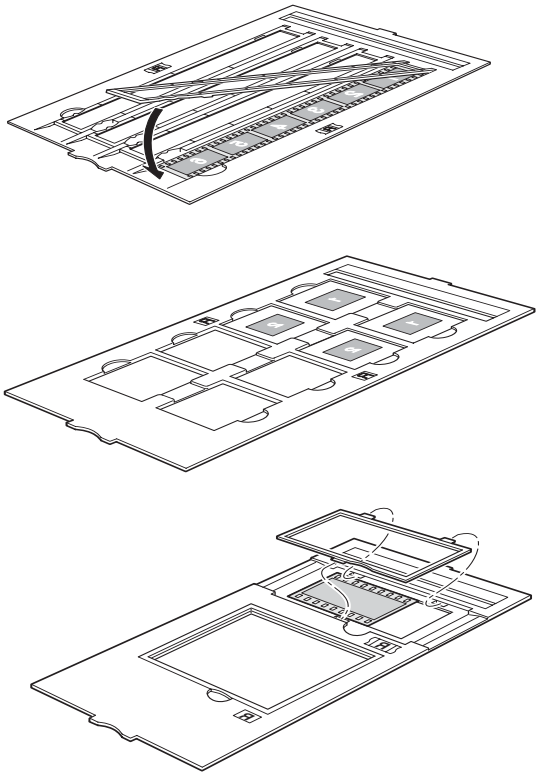

Figure 1-7

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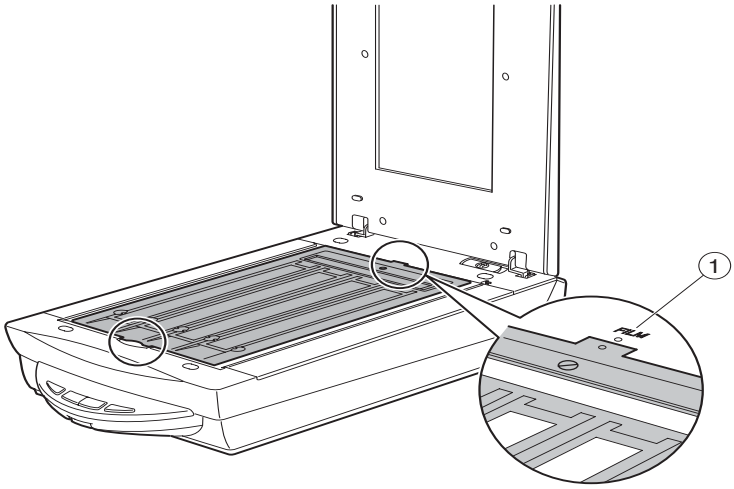
3) Place the loaded film guide by aligning its leading tab with FILM mark on the document glass and close the document cover.



① FILM Mark

Figure 1-8

4) Send the scan command from the host computer.

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IV. CUSTOMER'S DAILY MAINTENANCE

Dirt on the document glass may result in an unclear image or lines on an image. Clean the document glass according to the following steps.

1) Disconnect all the cables from the scanner.
2) Dampen a soft and clean cloth and wring it thoroughly. Wipe a dirt off the document glass with the cloth.
3) Completely wipe water off the document glass with a dry cloth.

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CHAPTER 2

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I. BASIC OPERATION

A. Functions

The scanner is composed of three systems including optical system, image processing system, and control system.

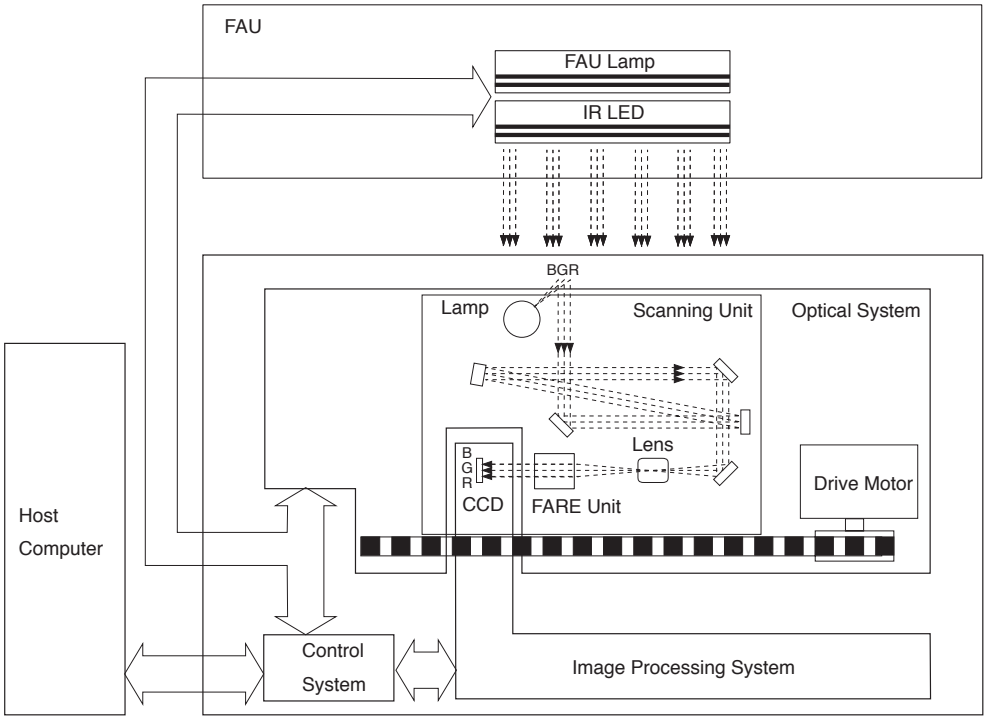

Figure 2-1

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B. Electrical System

1. Outline

Figure 2-2 is an electric system circuit diagram.
The scanner is not equipped with CPU. The device driver with a control program installed in the host computer functions as CPU. The host computer sends a command to the ASIC via the USB controller or IEEE 1394 controller. The ASIC controls the whole electrical circuits and image processing of the scanner. The image signals read by the CCD are converted into digital data by analog IC. The digital data is then processed by the ASIC and is output to the host computer via USB interface.

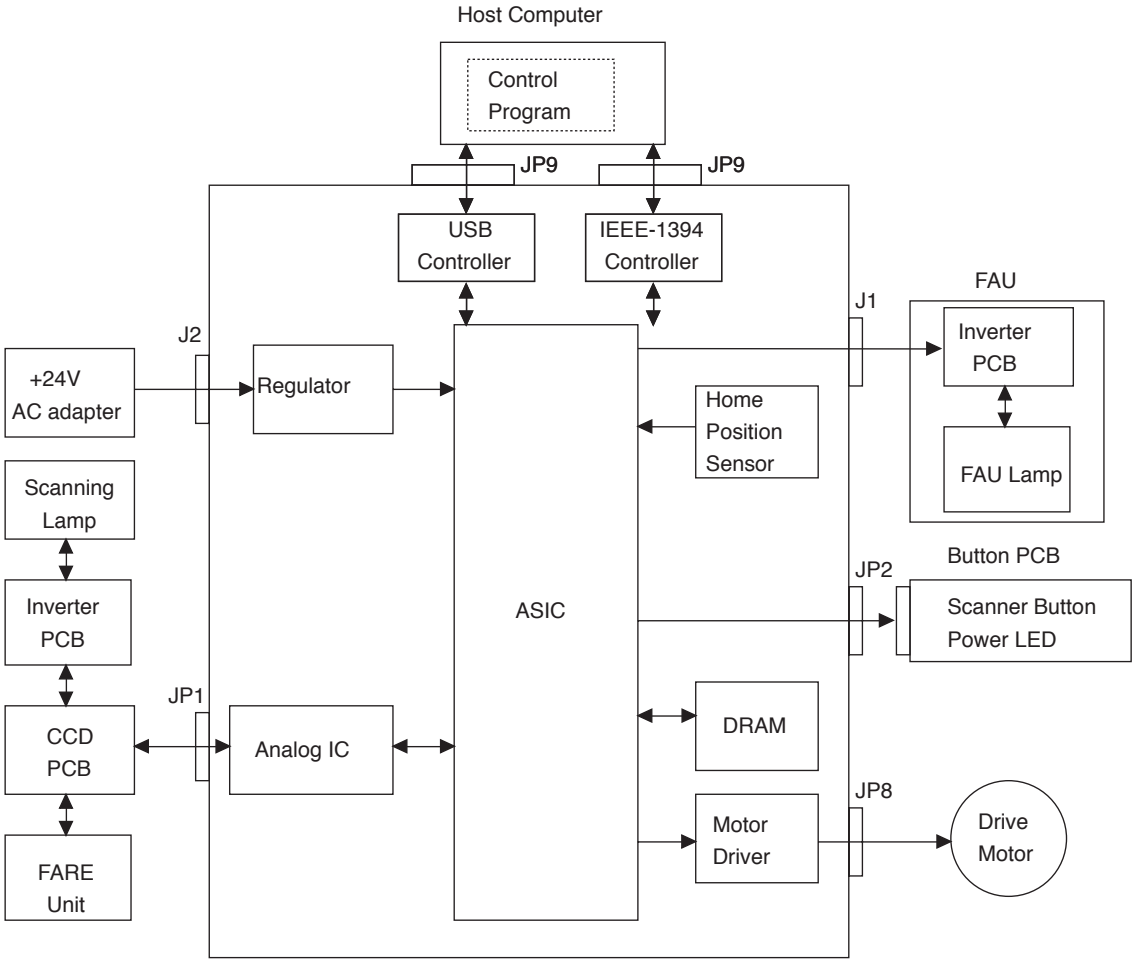

Figure 2-2

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2. Functions of Main PCB

1) Analog IC

Converts the image signals (analog signals) read by CCD into digital data.
- CDS (Correlated Double Sampling)
- AGC (Auto Gain Control)
- 8-bit A/D converter

2) ASIC

Performs the following transactions:
- DRAM control
- CCD timing clock creation
- Line buffer control
- CCD output line difference adjustment
- Image processing
- Shading correction
- Motor driver control

3) DRAM

Stores the shading compensation data when performing shading compensation.
Stores the image data when scanning.

4) Motor Driver

Supplies power to the drive motor.

5) USB Controller/ IEEE 1394 Controller

Controls data transfer between the host computer and ASIC.

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C. Main PCB Input and Output

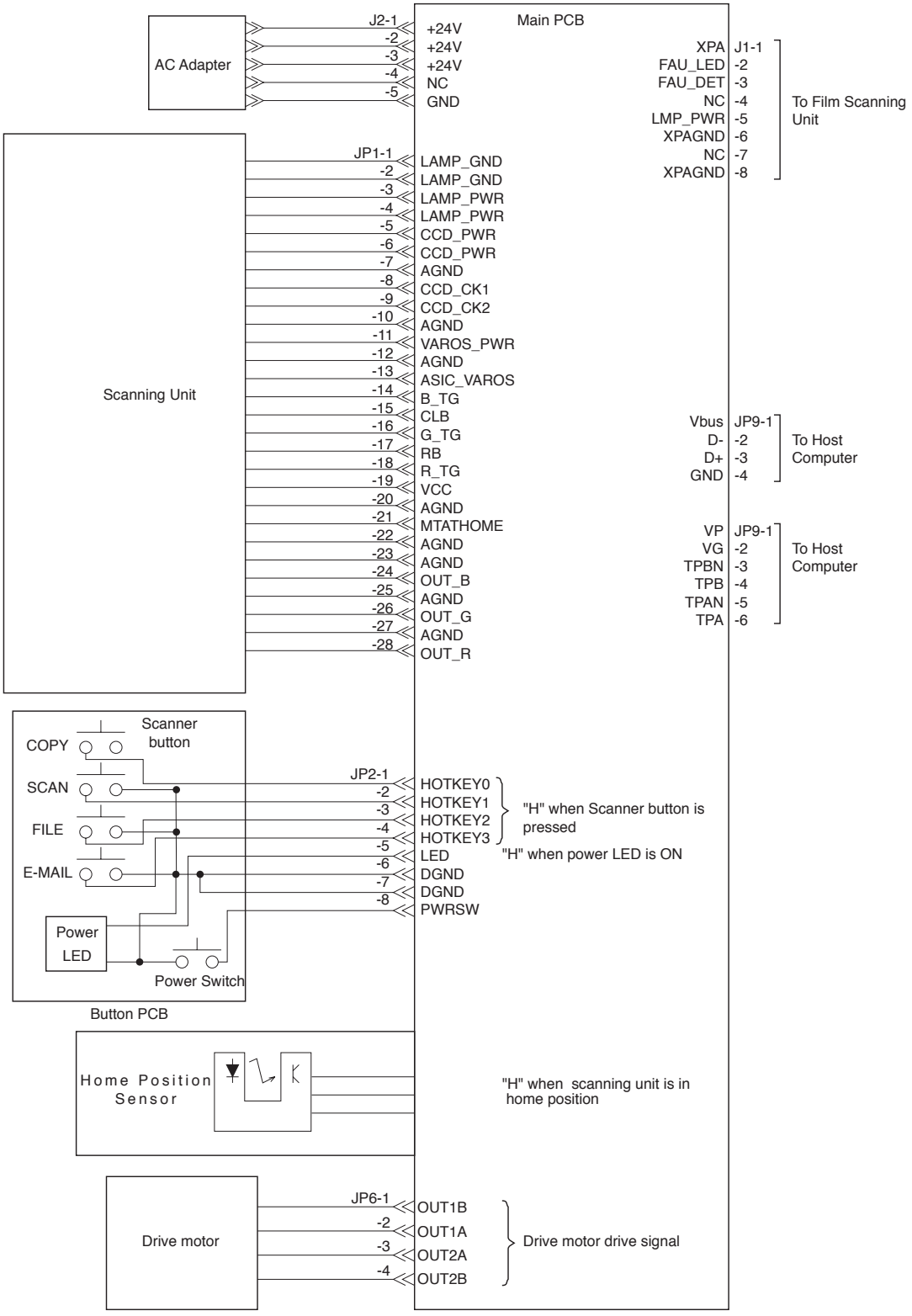

Figure 2-3

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D. Document Scanning Sequence

1. Document Scanning Sequence

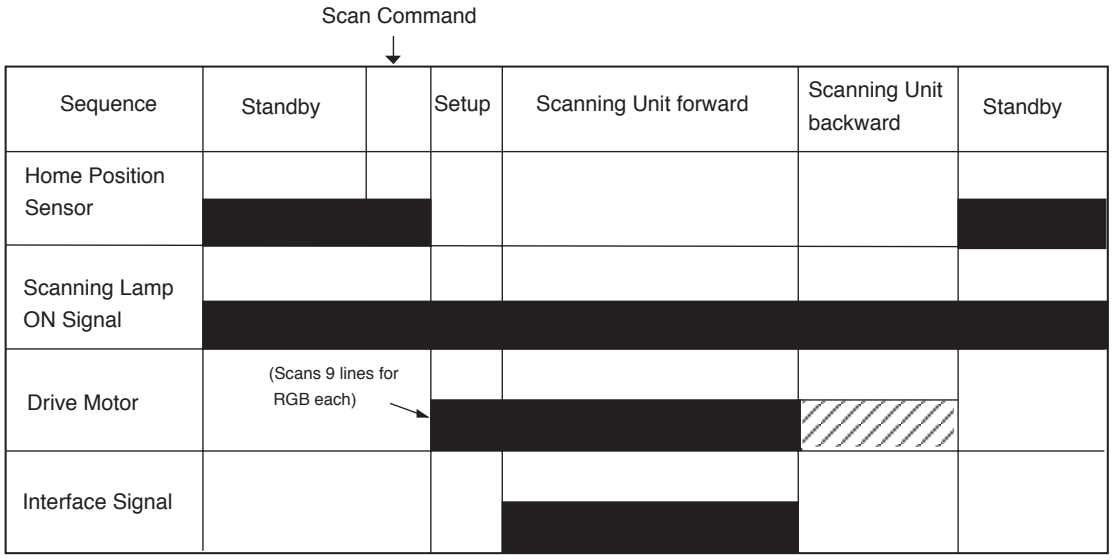

Figure 2-4

Seqence	Operation	Purpose	Remarks
Standby	After the scanner self test is completed until the scanner receives a scan command from the host computer	To maintain the scanner ready for scan	
Setup	From the scanner receives a scan command until it starts scanning	To execute calibration for setting light exposure time, gain data and shading data	The data is stored in DRAM
Scanning Unit Forward	After the scanner starts scanning until whole scan area specified by the host computer is scanned	To execute image processing according to the command from the host computer while scanning and send imada data to the host computer	
Scanning Unit backward	After the scanning unit starts moving backward until it returns to the home position	To return the scanning unit to the home position to ready for the next scan	Home position is detected by the home position sensor

Table 2-1

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II. OPTICAL SYSTEM

A. Outline

The optical system consists of the scanning lamp, lens and mirrors. When scanning a reflective materials such as papers , the original is exposed to the light of the scanning lamp in the scanning unit. The reflected light of the original forms an image on the photosensitive device, CCD (charge-coupled device) via lens and mirrors.

When scanning transparent material such as films, Light of the FAU lamp in the Film Adapter Unit transmits the film. The transmitted light forms an image on CCD.

When scanning with FARE function, IR LED instead of FAU lamp works to operate FARE unit.

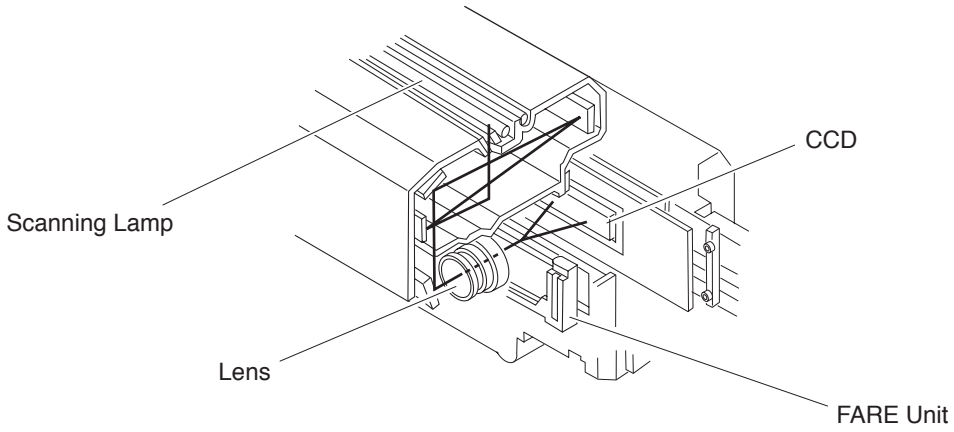

Figure 2-5

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B. Lamp Lighting Circuit

1. Scanning Lamp Lighting Circuit

When the scanner is turned on, or the host computer sends a scan command, ASIC turns on the scanning lamp lighting signal (LAMP) to light the scanning lamp.

The reflected light of the original is focused on CCD (charge-coupled device) via the five mirrors, lens and FARE unit.

The scanner is equipped with a lamp OFF function for energy saving. A built-in timer automatically turns off the lamp if no scanning command is sent from the host computer for a certain period of time. Setting up of the timer is conducted by the device driver.

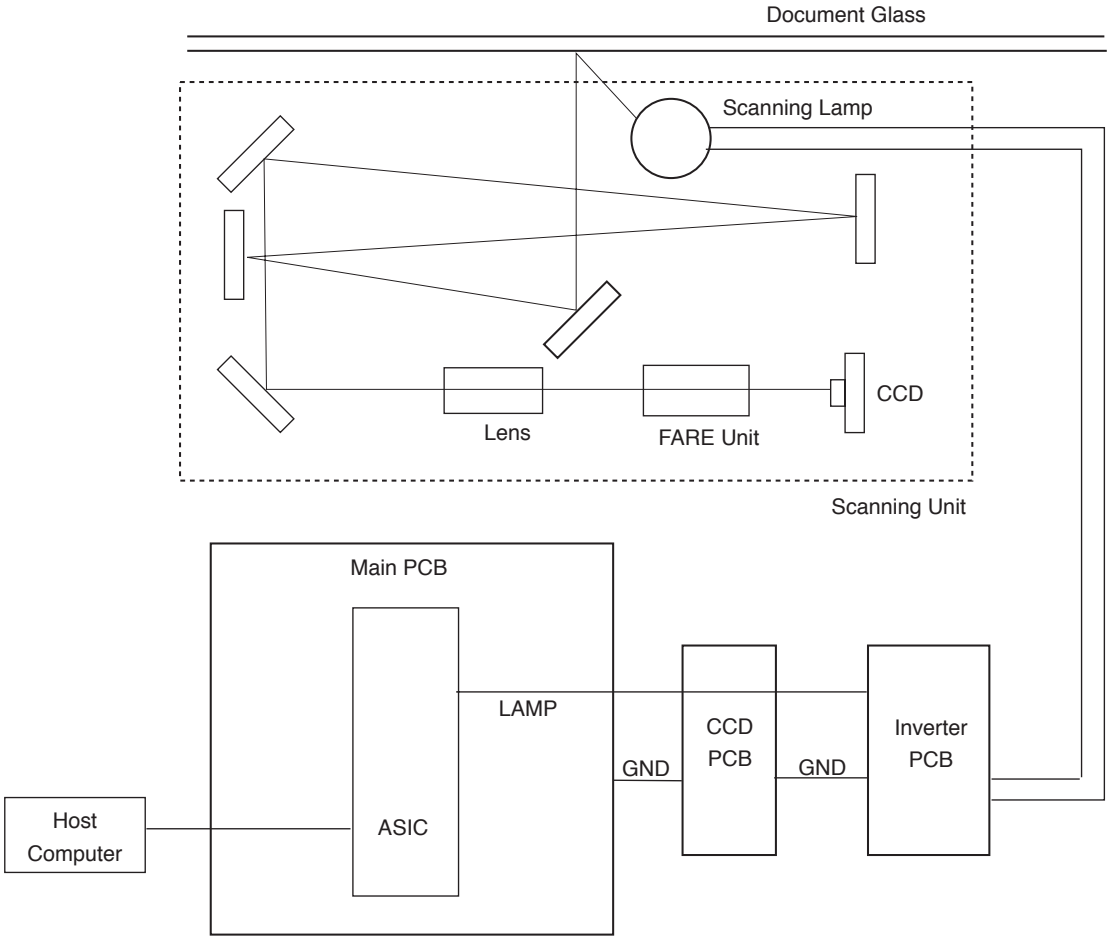

Figure 2-6

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2. FAU Lamp Lighting Circuit

Figure 2-7 is a FAU Lamp Lighting Circuit diagram.
When the host computer sends a film scanning command, ASIC turns off the scanning lamp lighting signal (LAMP) and simultaneously turns on FAU lamp lighting signal (XPA) to light the FAU lamp.

Light of the FAU lamp is converted into a flat light source by a light guide plate. The light is diffused by the1st diffusive film, the luminous intensity enhancement film and the 2nd diffusive film. Light transmitted the transparent plate all has the same luminous intensity as a result. Light transmits a film and is focused on the CCD in the scanning unit.

The FAU lamp also has a lamp OFF function for energy saving.

3. Infrared LED Lighting Circuit

When the host computer sends a command to light an IR LED, ASIC turns on IRLED signal to light the IR LED.
The IR LED light is converted into a flat light source by a light guide plate. Light transmits a film via the1st diffusive film, the luminous intensity enhancement film, the 2nd diffusive film and the transparent plate.

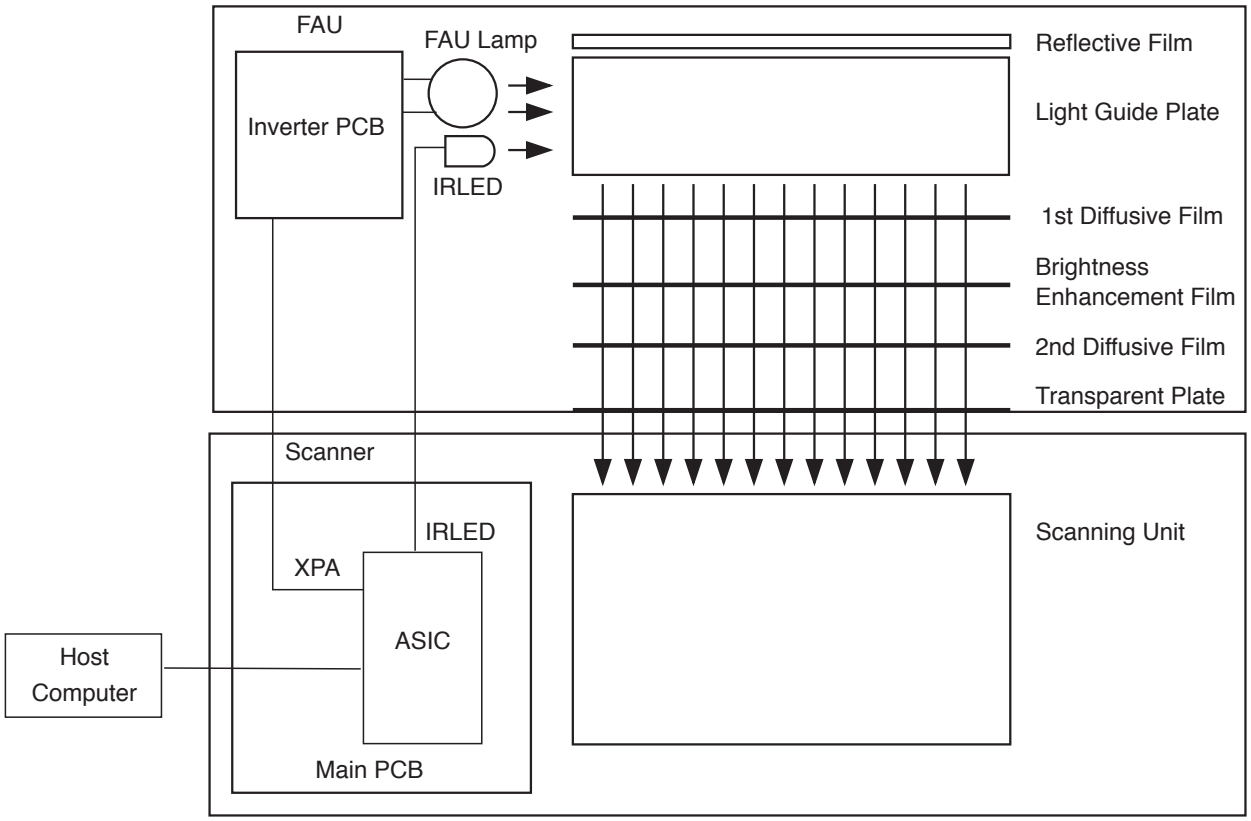

Figure 2-7

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C. FARE (Film Automatic Retouching and Enhancement)

1. Outline

When scanning a film, it is difficult to obtain a clean image because of dirt and scrach on the film. CanoScan 9900F is equipped with the IR LED in addition to the FAU lamp (cold cathode fluorescent lamp) to remove scratches and dirt on a film by scanning a film by two light sources. This function is called FARE (Film Automatic Retouching and Enhancement).

The IR LED scans only scratches and dirt on a film as image data. This data is compared to the full image data scanned by the FAU lamp, and the overlap data (that is of scratches and dirt) is deleted. The other scanned data of the film compensates for the deleted area, and the image without scratches and dirt is reproduced.

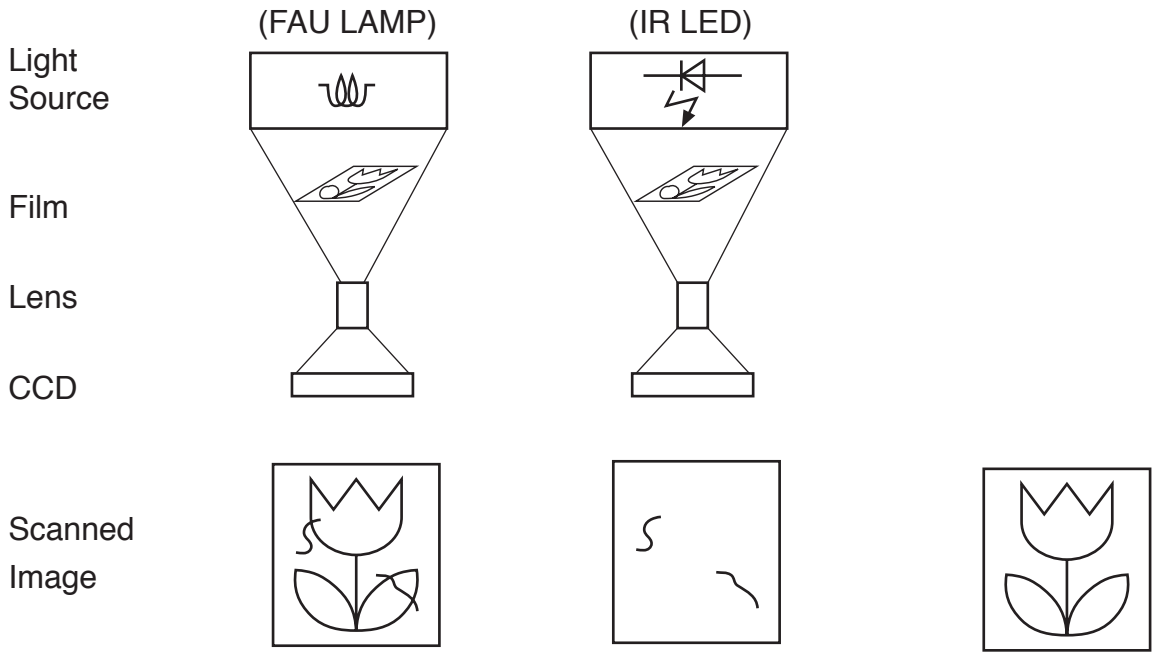

Figure 2-8

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2. Operating FARE Function

Two light sources mounted in CanoScan 9900F have different frequencies (the FAU lamp (cold cathode fluorescent lamp): 380- 700nm, and IR LED : 880nm). If there light sources are used under the same optical system, the image will be out of focus(Figure 2-9-2).

CanoScan 9900F is equipped with FARE unit. This unit is placed between the CCD and lens and is consists of a refraction glass that changes the refractive index of light and electromagnetic switch that change the position of the refraction glass.

First, scan a film with light of the FAU lamp transmitting the refraction glass. Secondl, scan a film with the IRLED and turn on the electromagnetic switch to move the refraction glass to the position where no IR LED light can transmit the glass (Figure 2-9-3).

Above functions make it possible to obtain the scanned image with the focus of light on the film while using two light sources with different frequencies.

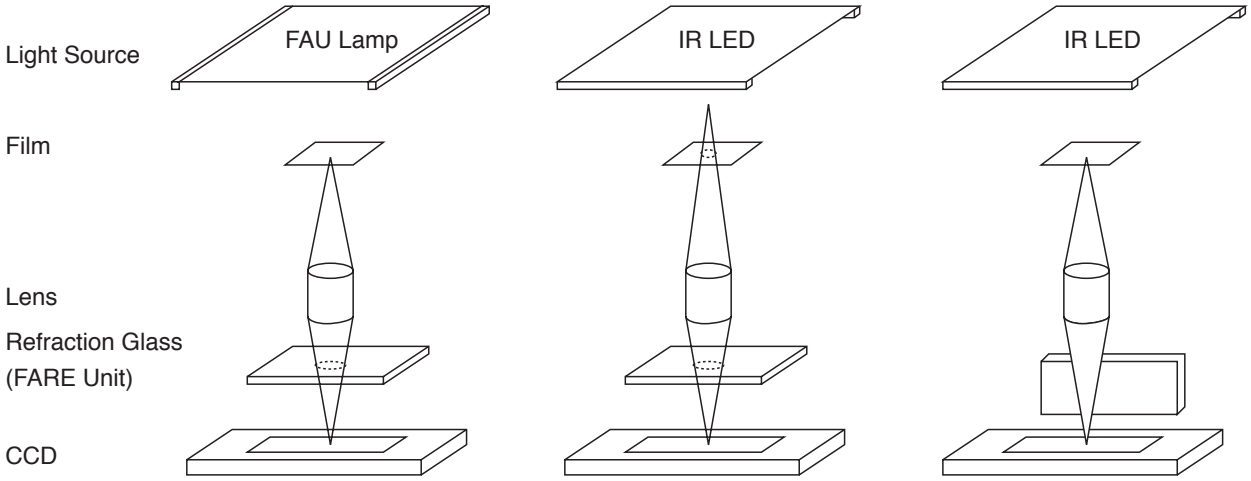

Figure 2-9-1 **Figure 2-9-2** **Figure 2-9-3**

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D. Motor Control Circuit

Figure 2-10 is a motor drive circuit diagram.
Control program analizes a command sent from the host computer, and sends a motor clock generation command to ASIC. Gate array generates eight-phase motor drive pulse signals [I01, I02, I11, I12, I21, I22, I31, I32]. These signals are sent to the drive motor via motor driver.

When the host computer changes the resolution, the control program commands ASIC to change the drive motor rotating speed by changing the frequency of the motor drive pulse signal .

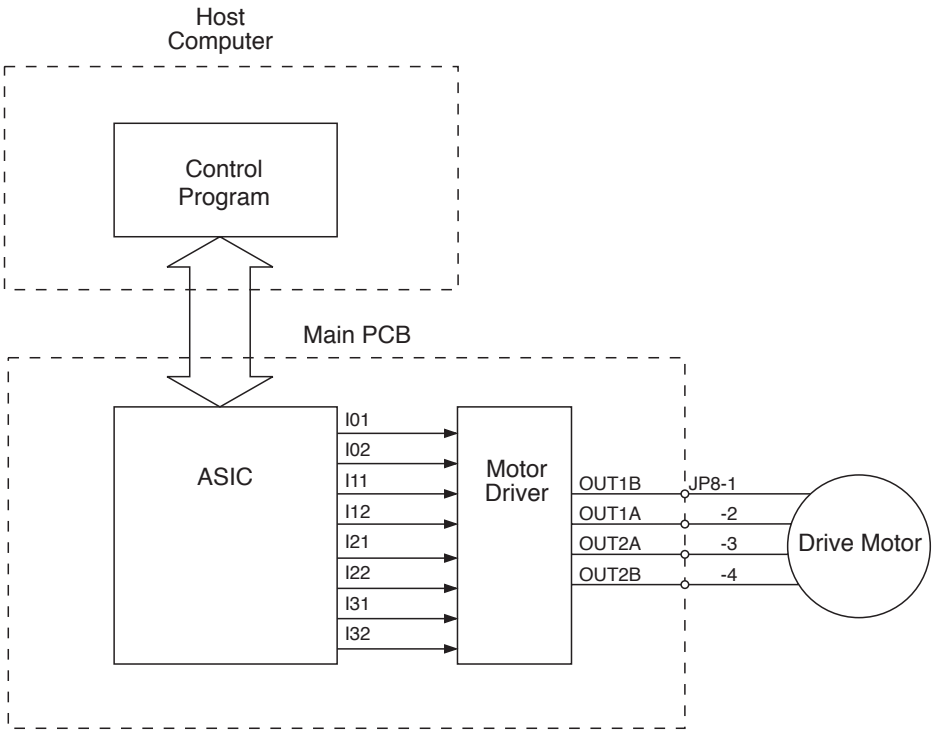

Figure 2-10

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III. IMAGE PROCESSING

A. Outline

Image processing system consists of the CCD, analog IC, and ASIC. Analog signal read by the CCD is converted into digital data, and the digital date is sent to the host computer.

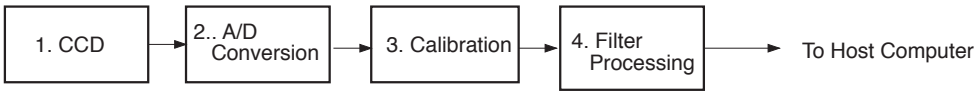

Figure 2-11

B. Image Processing

1. CCD

The CCD is a single chip photoelectric conversion device equipped with several thousand photosensitive devices. Each photosensitive devices is several microns square, and all devices are formed into a line to read RGB image signals with a built-in scanning circuit.
CanoScan 9900F uses 6-line CCD.

1) 6-line CCD

6-line CCD has two rows of photosensitive devices in staggered arrangement for RGB each. This measn that the image with the resolution worth 1600dpi x 2 = 3200dpi can be scanned by only one scanning operation.

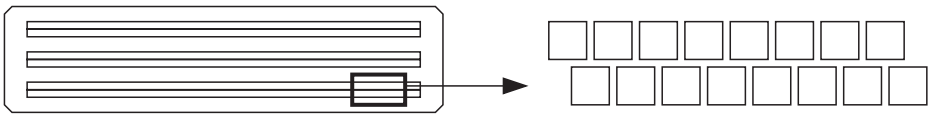

Figure 2-12

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2. A/D Conversion

Figure 2-13 is a block diagram that shows an internal processing of analog IC in the image processing system.

Output signal s from the CCD are analog signals, and they cannot be used as image data. So, RGB output signal from the CCD is amplified by analog amplifier to generate analog data. The data is then converted into image data by A/D converter.

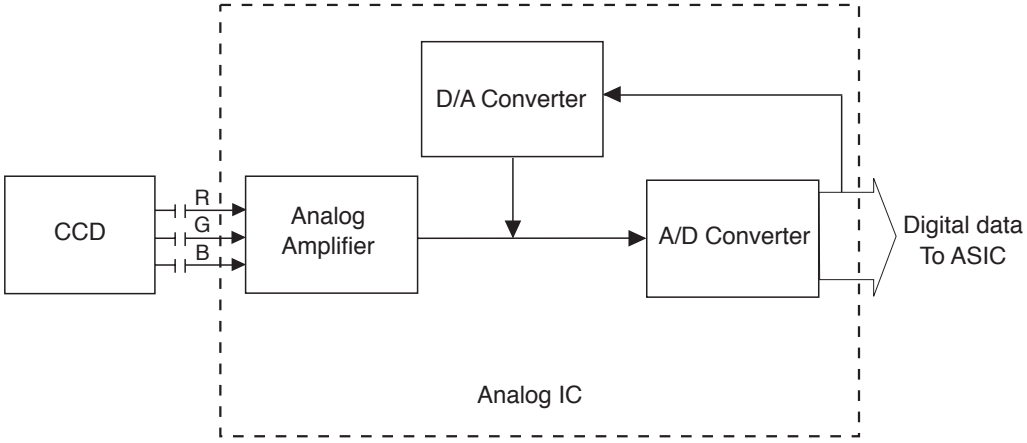

Figure 2-13

1) D/A Converter

D/A converter removes uneven data generated by the CCD' analog data. D/A converter adjusts CCD output to maintain a maximum value of input signal to A/D converter at 5V so that the black level of the image be constant.

2) A/D Converter

A/D converter converts the black-level-corrected image signal (analog signal) into a 16-bit image data (digital signal) in the order of red, green and blue image signal.

CanoScan 9900F uses 8-bit A/D converter. 5V is applied to the Vcc terminal, and reference voltage is applied to the Vref terminal. A/D converter outputs “0” when input signal is 5V, and outputs “255” when input signal equals to reference voltage. 1 pixel signal is converted into image data with 65536 tone for each colors including red, green and blue.

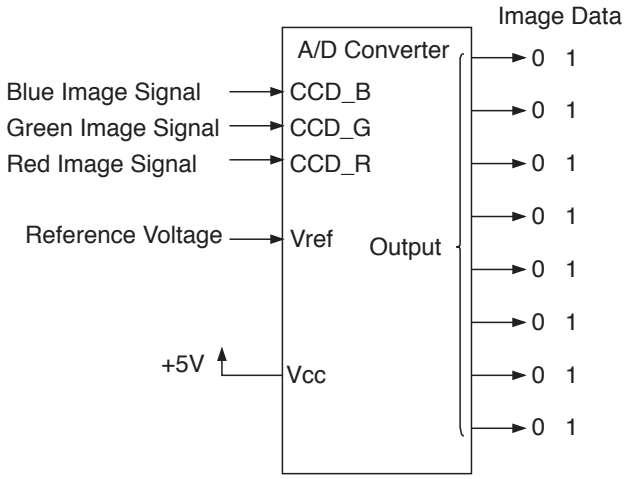

Figure 2-14

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3. Calibration

When scanning a document of even density, the image signal corresponding to each pixel may be uneven due to the following reasons:

* Uneven light intensity of the scanning lamp
* Variation in the sensitivity of the light phototransistors
* A slight output from the light phototransistors with no light

Calibration corrects these variations with the following three steps:

Offset Calibration
Coarse-gain Calibration
Programmable Gain Amplifier (PGA).

1) Offset Calibration

Normalize the output data from each pixel at the value of 0 or near 0 by using data aquired with no light.

2) Coarse-Gain Calibration

Finds the optimum gain setting to have the output voltage from all pixels within in the adjustment range of Programmable Gain Amplifier.

3) Programmable Gain Amplifier (PGA)

Calculates a gain coefficient to make output constant by correcting the output difference among pixels.

4. Filter Processing

Changing the resolution and the scaling tends to reduce the image quality. To prevent this, the filter processing needs to be performed according to the resolution. The filter processing includes interpolation processing and averaging.

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1) Interpolation Processing

When scanning at higher resolution, the image quality tends to be reduced. This is because one pixel output from the CCD is treated as two image data in the horizontal scanning direction, and one line output of the CCD is treated as two image data in the vertical scanning direction. The interpolation processing is performed to prevent the image quality reduction. Figure 2-15 shows a change in image density by the interpolation processing.

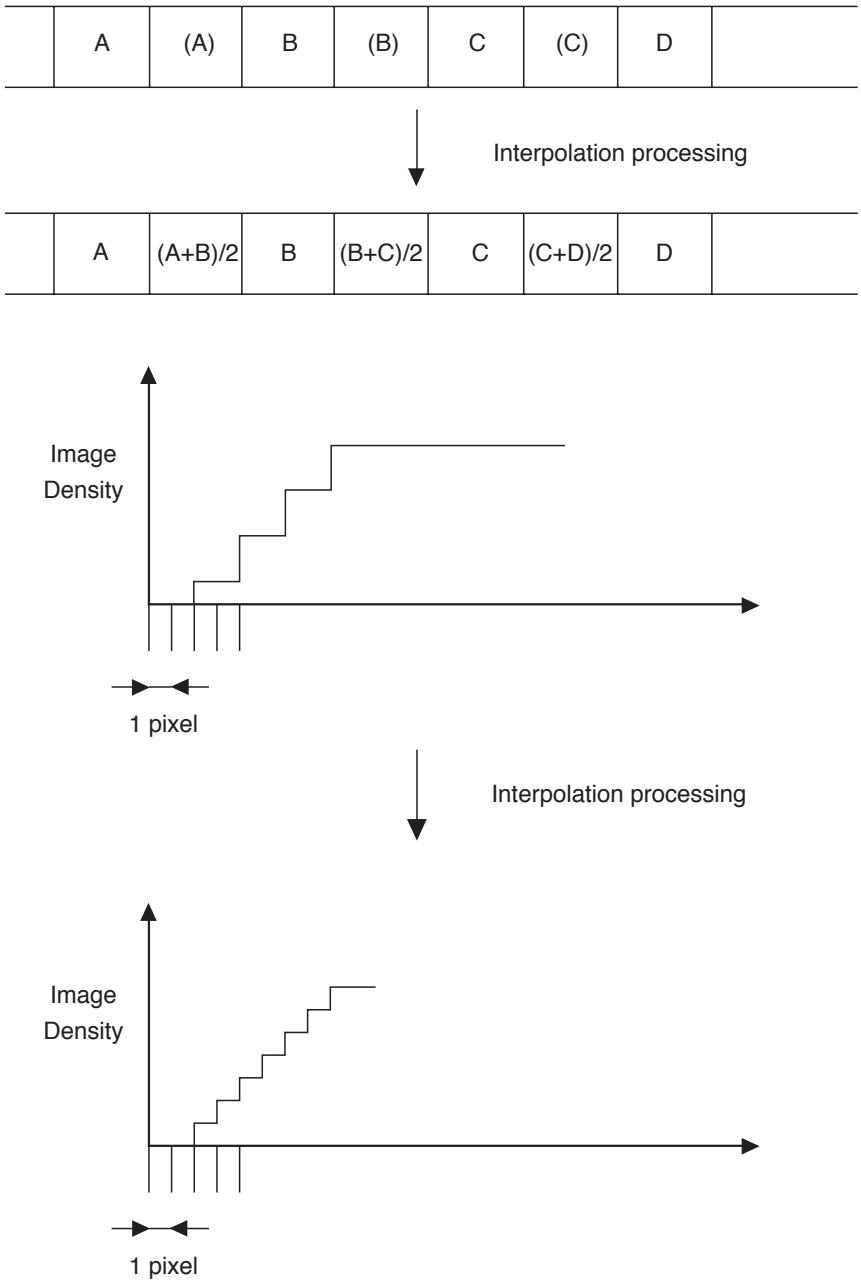

Figure 2-15

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2) Averaging

When scanning at lower resolution, the quality of output tends to be deteriorated. This is because data thining occures more frequently at lower resolution. Averaging is a process to average the data to be thinned and the data to be actually output to prevent the image deterioration.

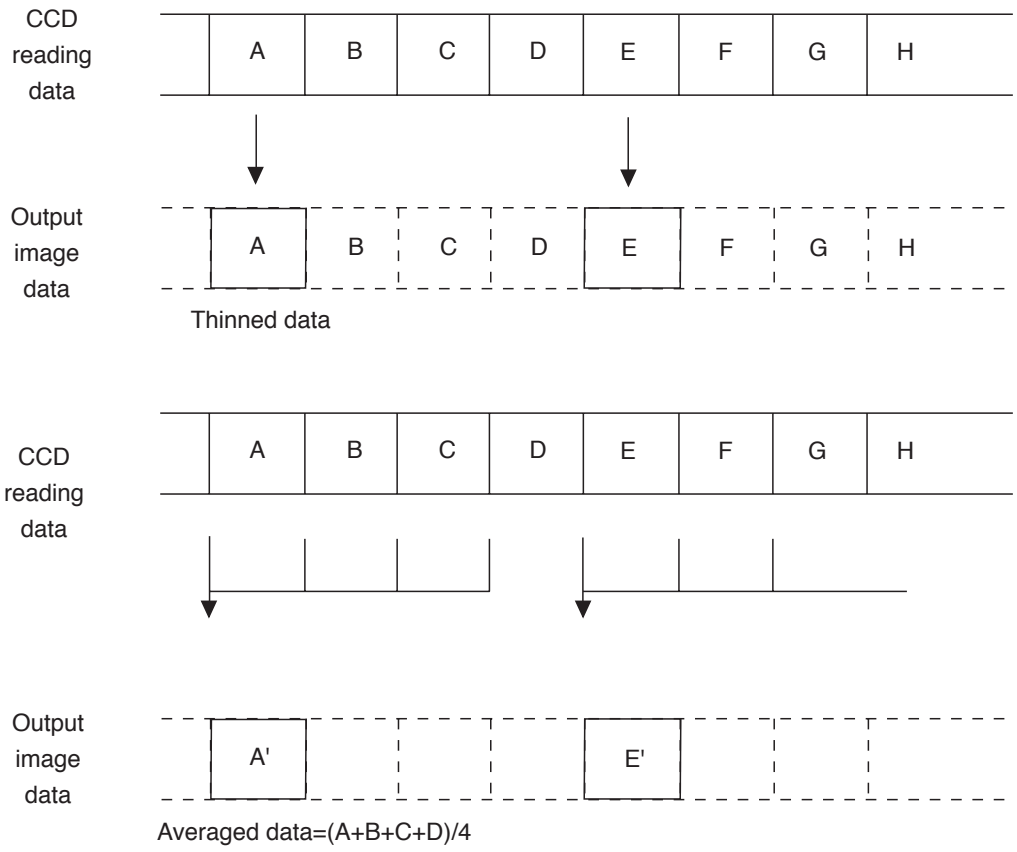

Figure 2-16

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IV. CONTROL SYSTEM

A. Control System Diagram

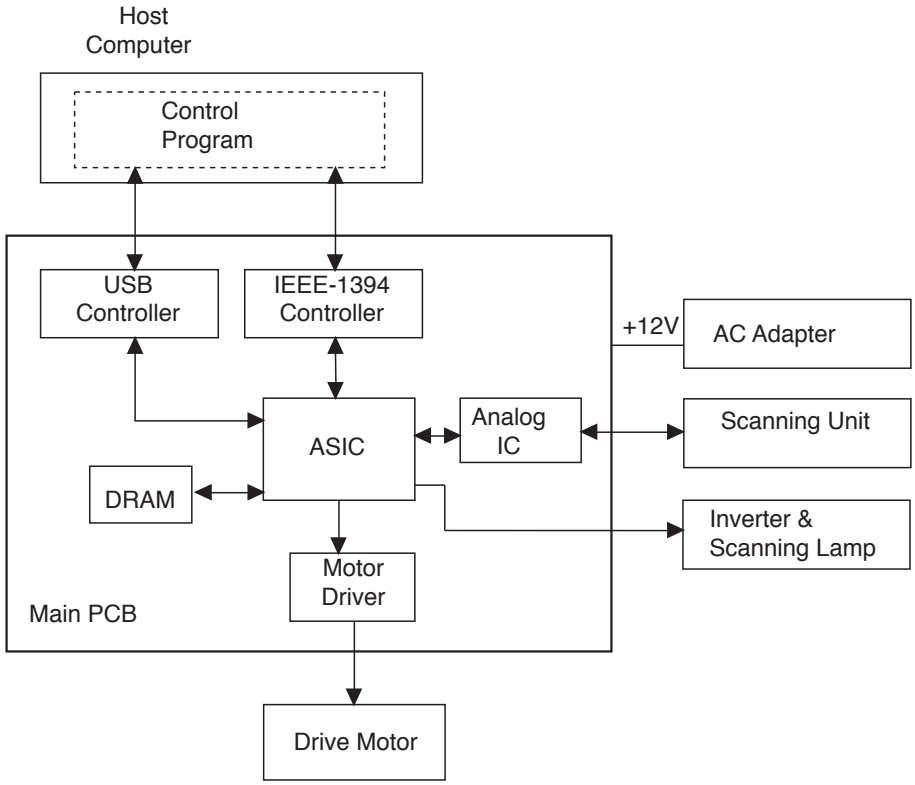

Figure 2-17

B. Main PCB

The scanner is not equipped with CPU. Control program in the device driver installed in the host computer includes a control program works as CPU. Control program sends a command to the ASIC in the main PCB, and the ASIC controls the entire scanning operation.

The main PCB consists of ASIC, DRAM, USB controller, analog I/C and motor driver.

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V. INTERFACE

A. USB

1. Outline of USB standard

CanoScan 9900F employs USB2.0.
Features of USB include:

1. USB is an interface to connect peripheral devices to a host computer.
2. Tree-structure can connect 127 devices to a single host computer by using "hub".
3. USB has three data transfer modes including "full speed mode" at 12Mbps, "low speed mode" at 1.5Mbps, and "high speed mode" at 480Mbps (new standard of USB 2.0.) CanoScan 9900F supports USB2.0's "high speed mode".
4. Hot plug (connectable/disconnectable with power supplied) is available.
5. Power source is supplied via USB.

2. Signal Definitons

USB uses only two identification signal lines (D+ and D-) to communicate with the host computer.

Pin	Signal
1	V_{BUS}
2	D-
3	D+
4	Signal GND
Shell	Chassis GND

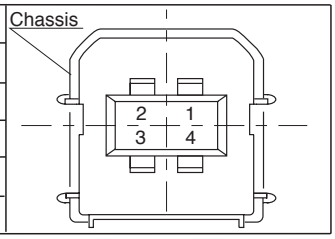
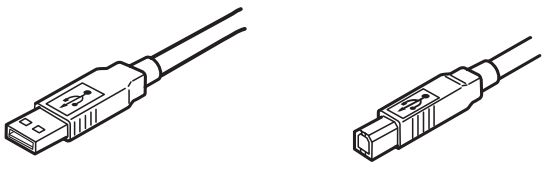


Table 2-2

3. Interface Connection

USB connector has two plugs: A plug for upper layer and B plug for lower layer.



A Plug
To Host Computer

B Plug
To Scanner

Figure 2-18

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B. IEEE 1394

1. Outline of IEEE 1394 Standard

IEEE is a standard for high-speed serial interface called "Firewire" or "i.LINK"
Features of IEEE 1394 includes:

1. No host computer is necessary as communication between peripherals is possible.
2. IEEE uses daisy chain as a connection method, and maximum 63 connections are possible.
3. IEEE transfers data with high-speed serial transfer with three kinds of transfer speed including 100Mbit/s (noted as S100), 200Mbit/s (S200), and 400Mbit/s (S400). CanoScan 9900F supports S100.
4. Hot plug is available.
5. Two kinds of connectors are available: 6-pin-connector with power supply and 4-pin-connector without power supply

2. Signal Definition

CanoScan 9900F uses 6-pin-connector as an interface.

PIN	SIGNAL
1	VBUS
2	GND
3	Data B-
4	Data B+
5	Data A-
6	Data A+

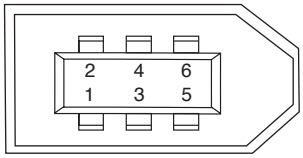

Table 2-3

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VI. POWER SUPPLY

DC power is supplied from the supplied AC adapter. Through power regulator, four DC power sources (+3.3V, +5V, +12V and +16.8V) are used in the circuit. +3.3V and +5V are supplied for the digital circuit and linear chip, +5V is for the Analog IC and home position sensor, +16.8V is for the CCD PCB, +12V is for the scanning lamp, and +24 for the motor drive.

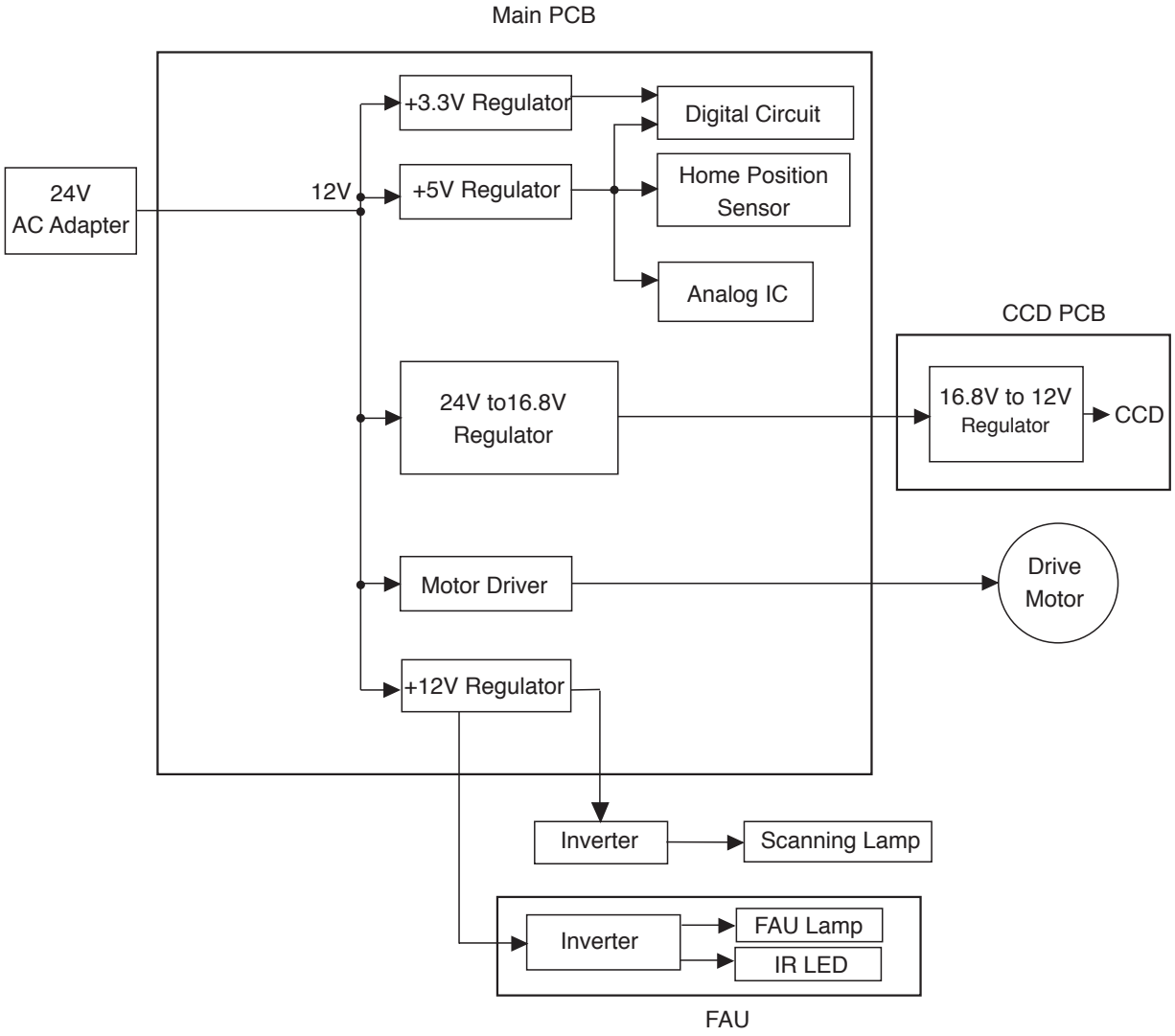

Figure 2-19

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CHAPTER 3

MECHANICAL SYSTEM

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I. PARTS REPLACEMENT

A. Precautions

* Disconnect the AC adapter, USB cable, and FAU cable from the scanner before replacing the parts.
* Wear anti-static gloves and grounding strap around the wrist during the work.
* Follow the instructions. Do not remove any screw from the parts that need no replacement.
* Store the removed parts in a clean place and do not displace them.
* Assemble the scanner by following the replacement procedures backward, unless otherwise specified.
* After replacement, check the quantity and shape of the replaced parts.

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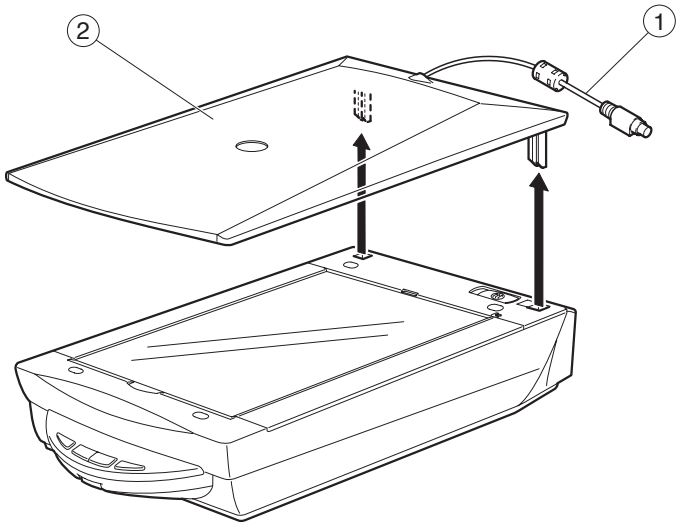
II. EXTERNALS

A. Removing the Film Adapter Unit

1) Disconnect the FAU cable.
2) Lift the film adapter unit as shown in Figure 3-1 to remove it.



① FAU Cable
② Film Adapter Unit

Figure 3-1

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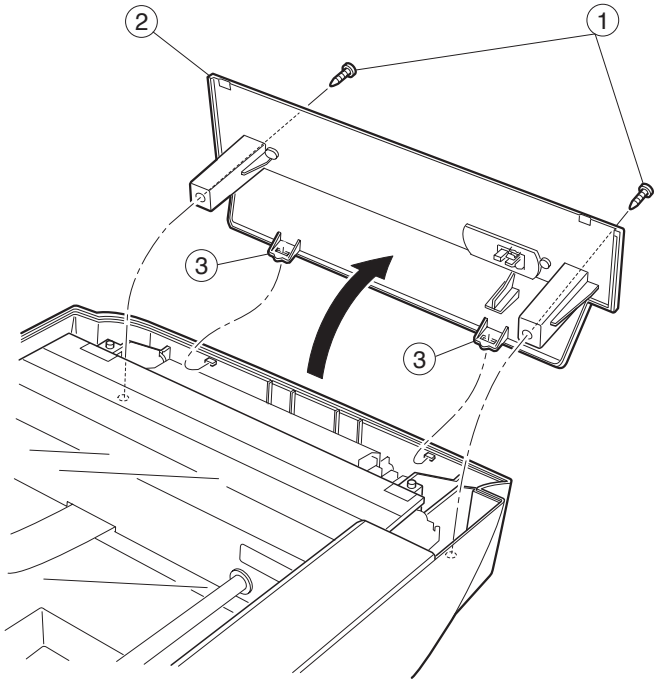
B. Removing the Top Cover and the Document Glass Unit

1) Remove two screws that hold the Top Cover .
2) Remove the Top Cover by holding the front part of the cover and turning it toward the outside.



① Screw
② Top Cover
③ Hook

Figure 3-2

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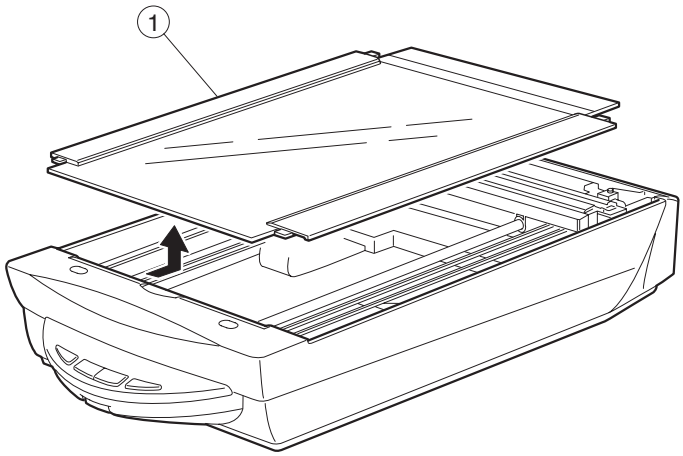
3) Slide the document glass unit backward and lift it. Remove the glass from the scanner.



① Document Glass Unit

Figure 3-3

C. Attaching the Front Panel

1) Make sure that corners of the Top Cover and the Bottom Cover are aligned when screw them to the scanner.

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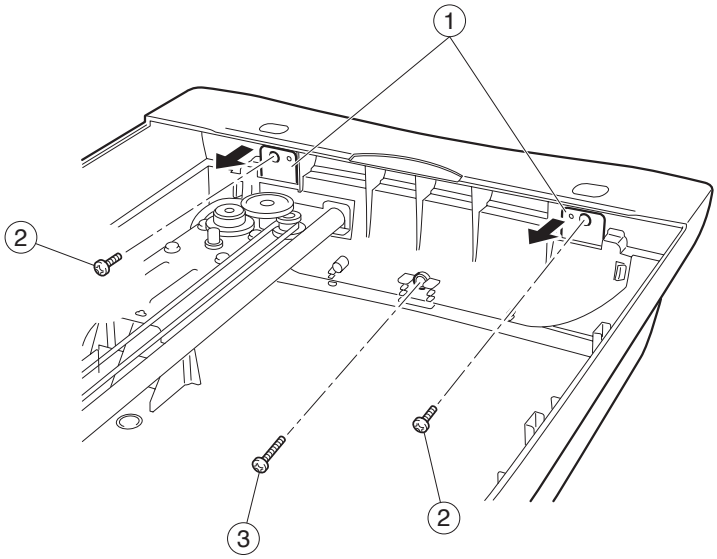
D. Removing the Front Panel

1) Remove the Front Panel from the scanner.
   (Refer to III-A Removing the Main PCB)
2) Remove the Top Cover and the Document Glass.
3) Remove the Carriage Unit and the Motor Unit
   (Refer to IV OPTICAL SYSTEM)
4) Remove a long screw in the center and two short screws on the edge.
5) Press two hooks until they make a snapping sound.



① Hook
② Screw
③ Long Screw

Figure 3-4

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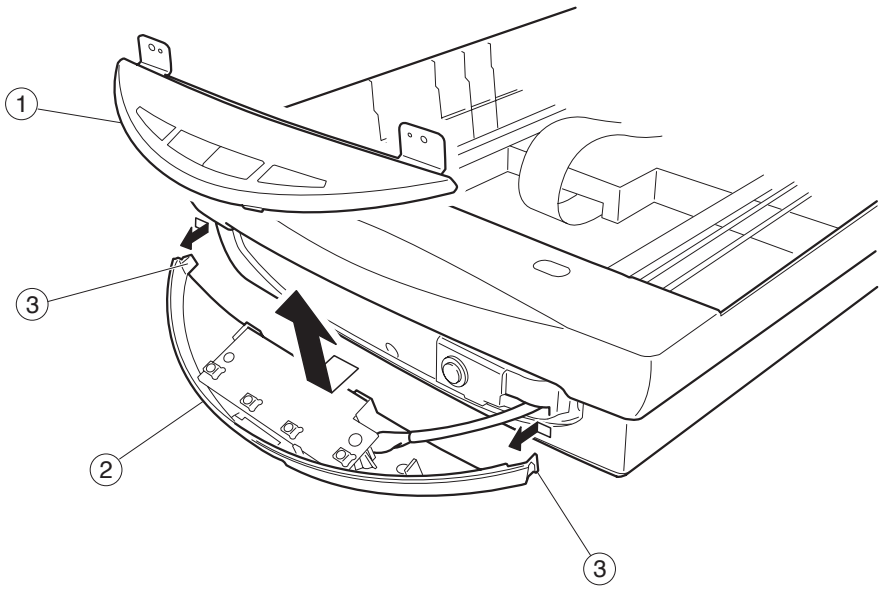
6) Press two hooks on both sides of the front panel inward. Remove the front panel and the button PCB unit from the main frame.



① Front Panel
② Button PCB Unit
③ Hook

Figure 3-5

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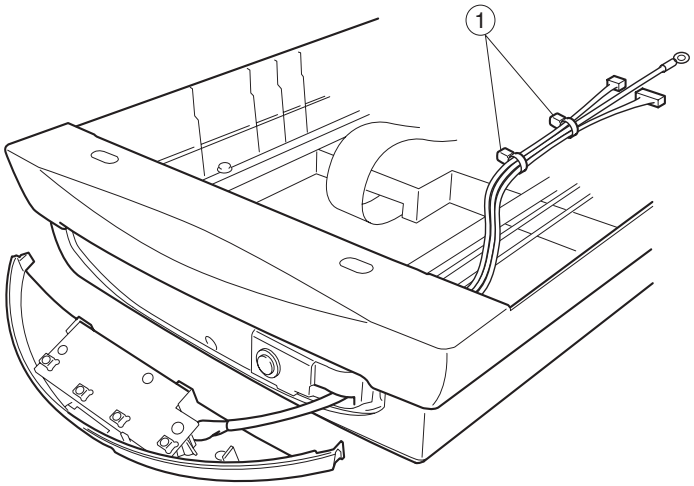
7) Cut off cable bands and disconnect cables from the main frame. Remove the button PCB unit.



① Cable Band

Figure 3-6

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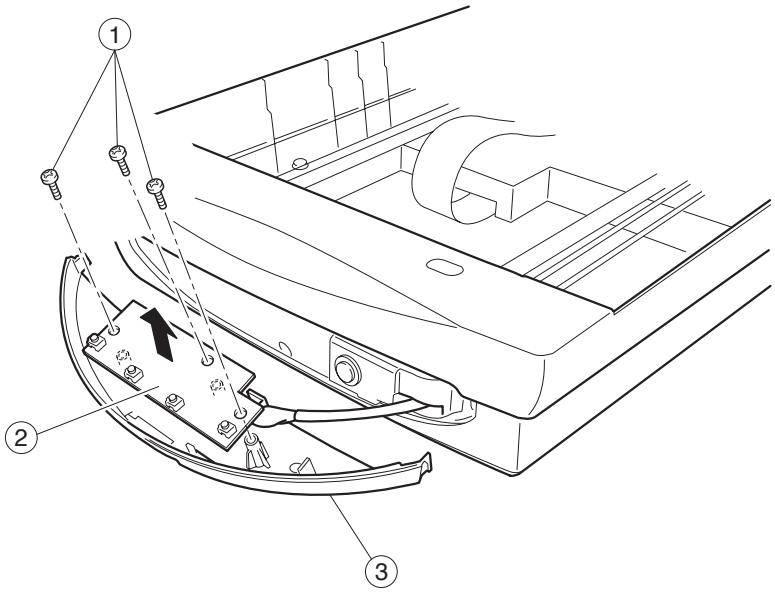
8) Remove three screws and remove the button cable board.



① Screw
② Button PCB
③ Lower Button Cover

Figure 3-7

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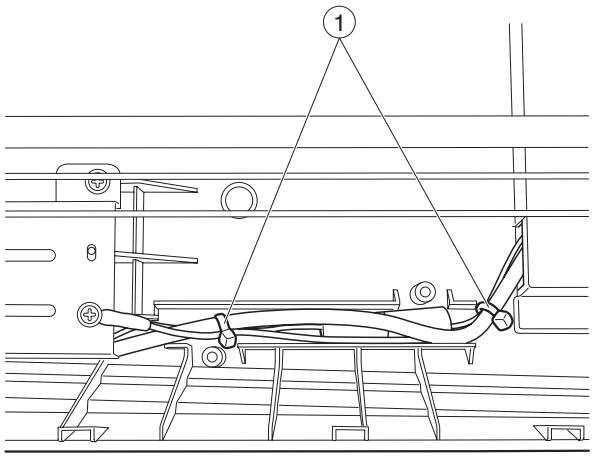
E. Attaching the Front Panel

1) Pass the button cables through the main frame.
2) Fix cables to the main frames with cable bands as shown in Figure 3-8



① Cable Band

Figure 3-8

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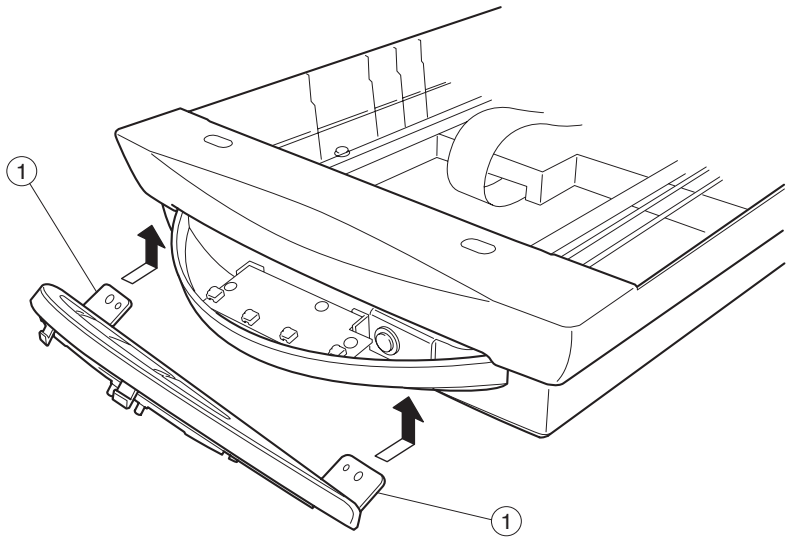
3) Attach the button PCB unit to the main frame.
4) Insert the hook of the front panel to the main frame as shown in Figure 3-9.



① Hook

Figure 3-9

5) Push the front part of the front panel until it makes a snapping sound.

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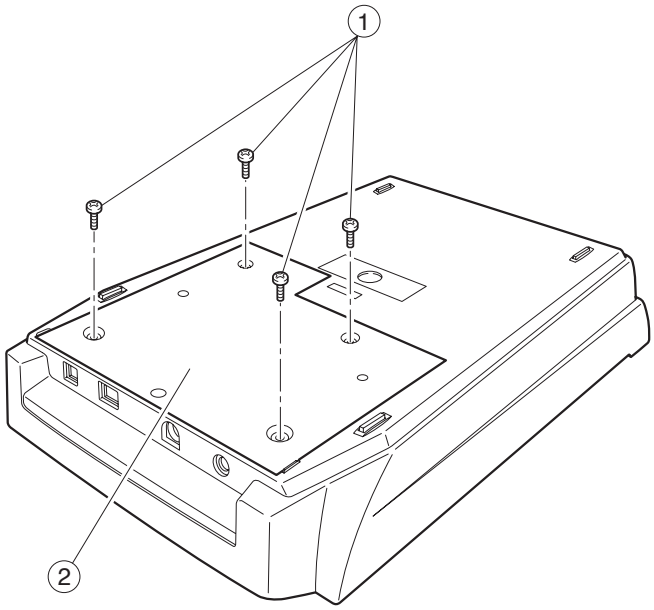
III. PCBs

A. Removing the Main PCB

1) Turn the scanner over and remove four screws.



① Screw
② Main PCB

Figure 3-10

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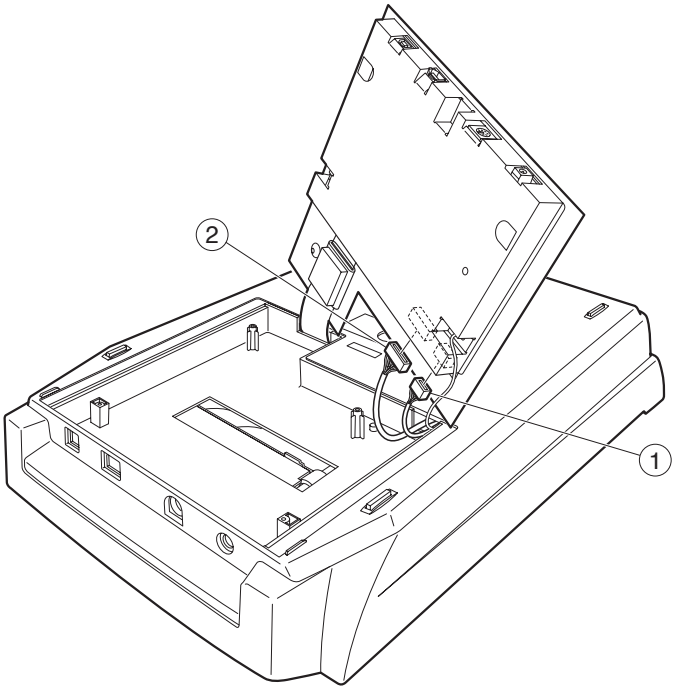
2) Lift the main PCB as shown in Figure 3-11 and disconnect the button cable and the motor unit cable.



① Motor Unit Cable
② Button Cable

Figure 3-11

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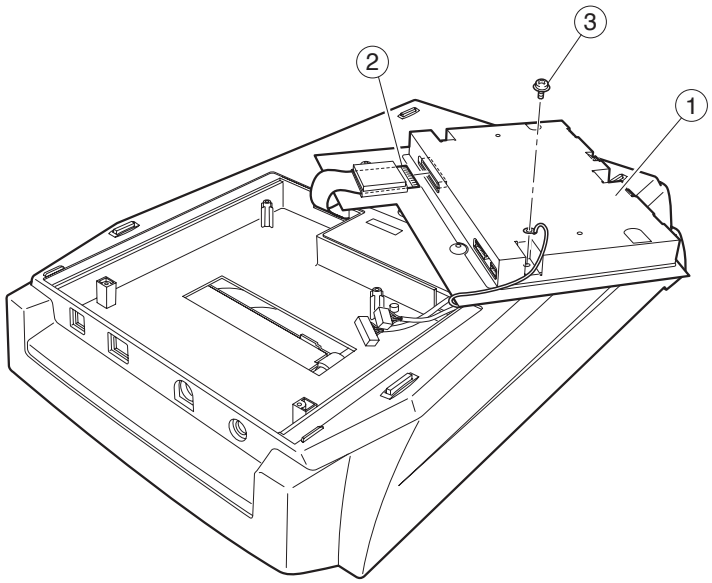
3) Turn the main PCB over. Remove screw that holds grounding and the flat cable. Remove the main PCB from the main frame.



① Main PCB
② Flat Cable
③ Screw

Figure 3-12

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IV. OPTICAL SYSTEM

A. Removing the Scanning Unit

Note: Lens and mirrors of the scanning unit are factory adjusted.
Do not touch the lamp, mirrors, and CCD PCB (shaded area shown in Figure 3-13) of the scanning unit.

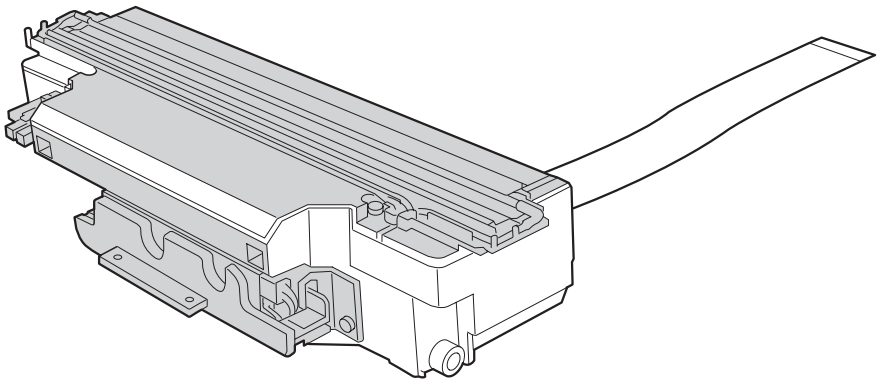

Figure 3-13

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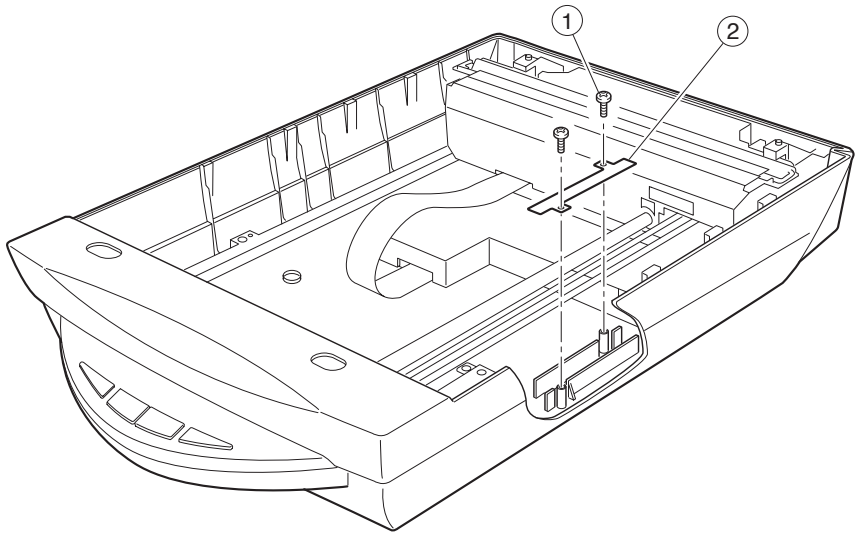
1) Remove the main PCB.
2) Remove the top cover and the document glass unit.
3) Remove two screws and remove the cable cover.



① Screw
② Cable Cover

Figure 3-14

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4) Slide the scanning unit from the home position by holding the edge of the unit as shown in Figure 3-15.

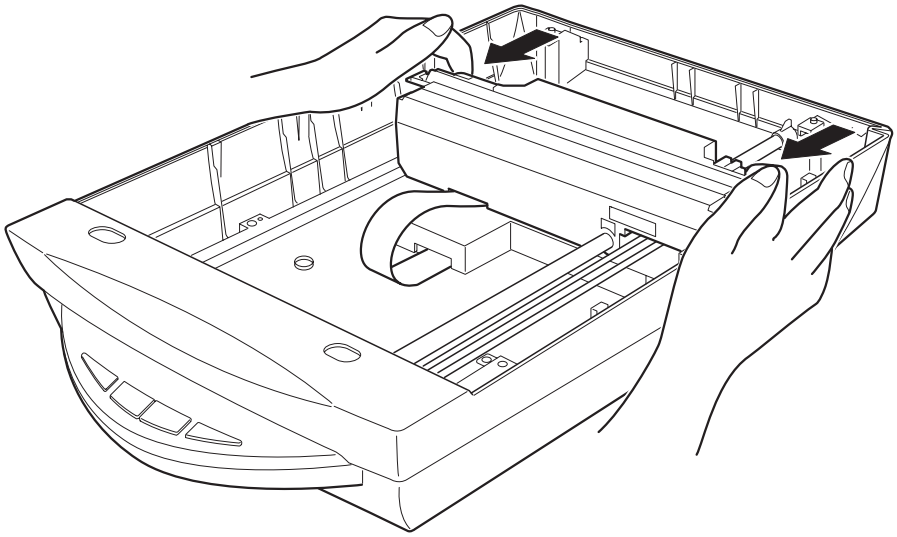

Figure 3-15

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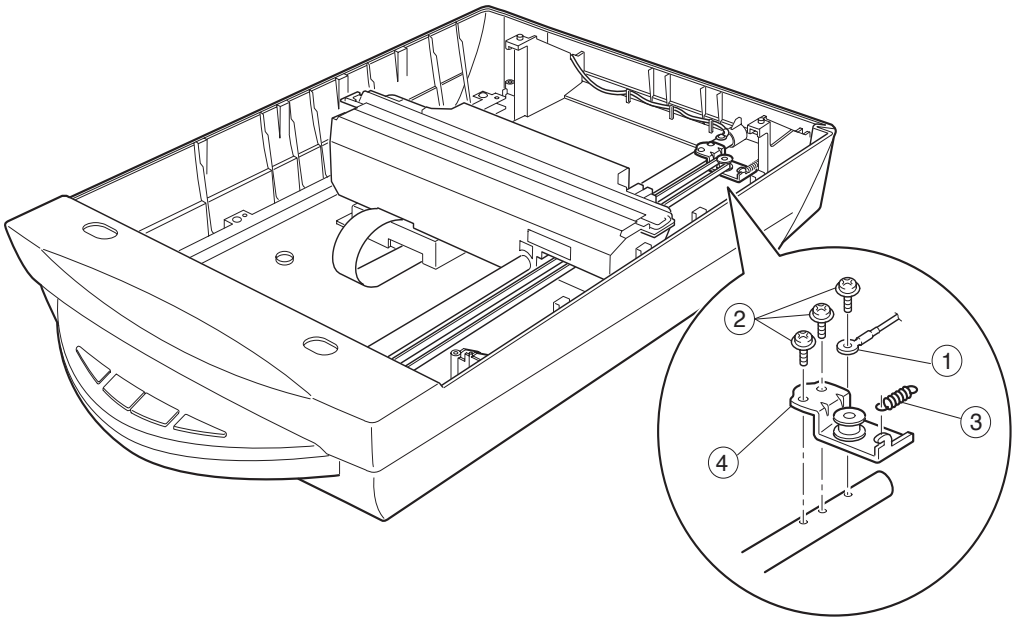
5) Remove two screws that hold the gear plate 2 . Remove spring from the gear plate 2.
6) Remove screw that holds grounding.



① Grounding Cable
② Screw
③ Spring
④ Gear Plate 2

Figure 3-16

Note: When installing the gear plate 2, adjust the tension of the timing belt by spring hooked on the gear plate. Then fasten the gear plate on the sliding rod with screws.

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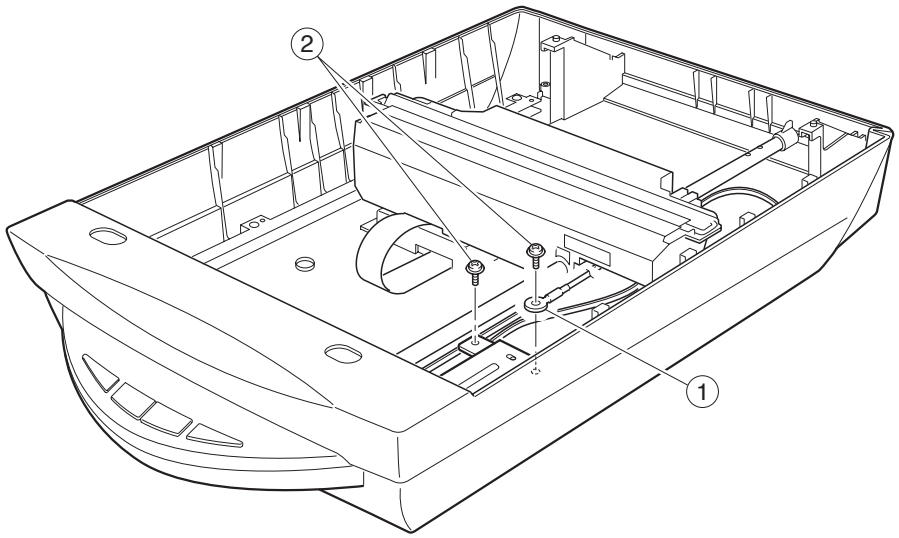
7) Remove two screws that hold the motor unit to the main frame.



① Grounding Cable
② Screw

Figure 3-17

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8) Push the sliding rod toward the front panel and slide the edge of the rod aside.

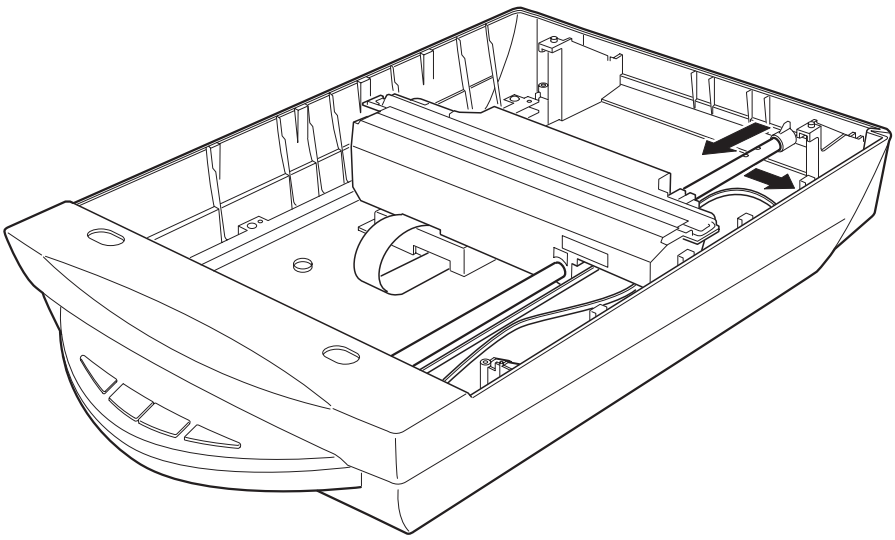

Figure 3-18

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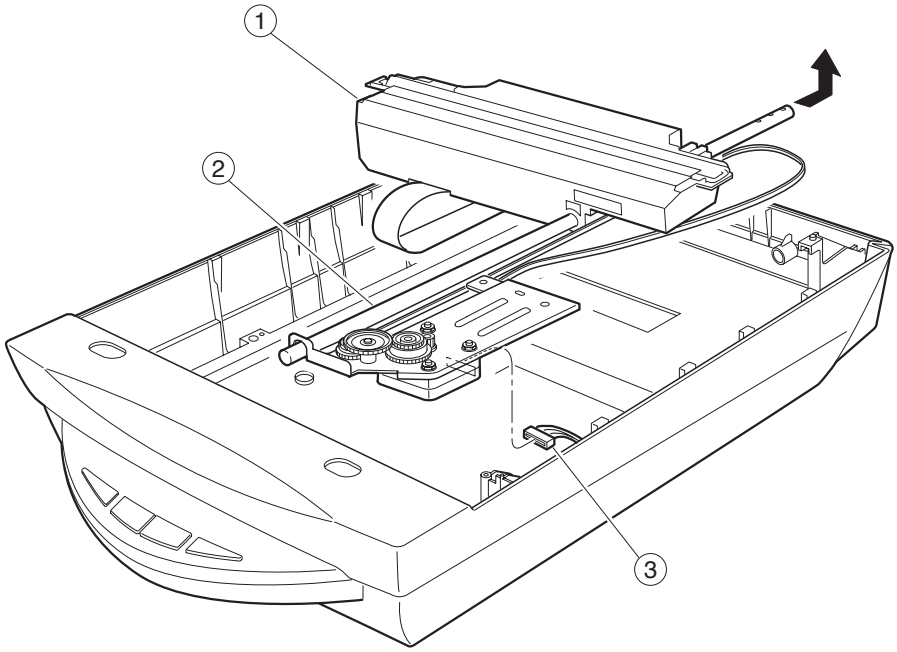
9) Slide the slidng rod backward and lift it as shown in Figure 3-19.
Disconnec the motor connector. Remove the sliding unit first and the scanning unit out of the main frame.



① Document Scanning Unit
② Sliding Rod
③ Motor Connector

Figure 3-19

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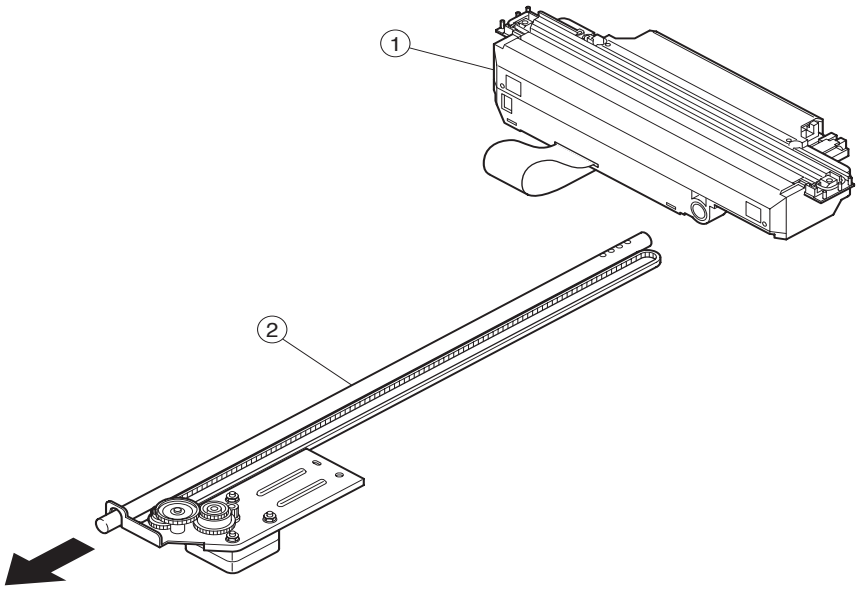
10) Remove the sliding rod and the timing belt from the scanning unit.



① Scanning Unit
② Sliding Rod

Figure 3-20

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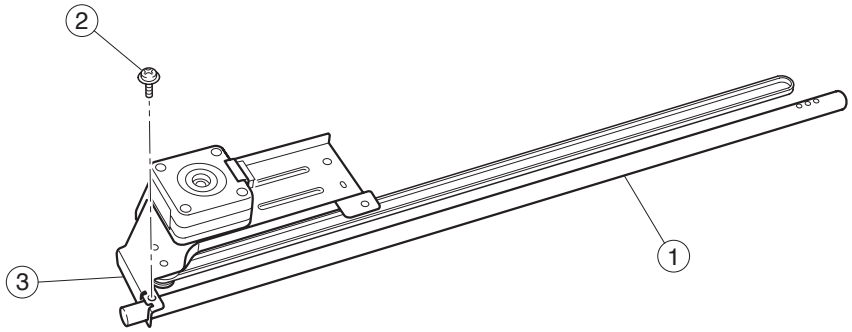
B. Removing Motor Unit

1) Remove the main PCB.
2) Remove the top cover and the document glass.
3) Remove the scanning unit.
4) Remove a screw that holds the sliding rod to the motor unit.



① Sliding Rod
② Screw
③ Motor Unit

Figure 3-21

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C. Attaching the Motor Unit

1) Apply grease (EM-50L) to the shaft of the gear when attaching the motor unit to the main frame. Make sure that no grease be applied to other parts.

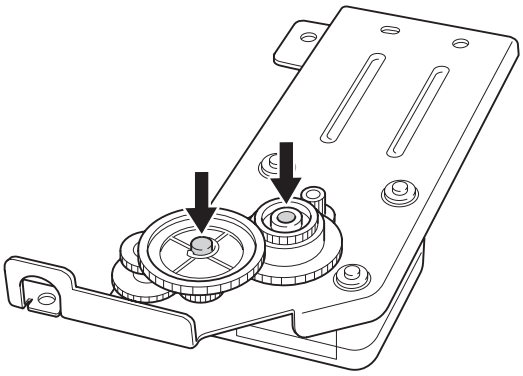

Figure 3-22

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CHAPTER 4

MAINTENANCE AND SERVICING

I. PERIODICAL REPLACEMENT PARTS 4-1

II. CONSUMABLE PARTS DURABILITY 4-1

III. PERIODICAL SERVICING 4-1

IV. SPECIAL TOOLS 4-1

V. SOLVENTS AND LUBRICANTS 4-1

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I. PERIODICAL REPLACEMENT PARTS

None

II. CONSUMABLE PARTS DURABILITY

None

III. PERIODICAL SERVICING

None

IV. SPECIAL TOOLS

None

V. SOLVENTS AND LUBRICANTS

Grease used for disassembly and reassembly of the scanner.

Name : MOLYKOTE EM-50L
Tool No. : HY9-0007
Usage : To be applied to the shaft of the gear of the motor unit and pulley unit.

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CHAPTER 5

TROUBLESHOOTING

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B. Others 5-1
II. TROUBLESHOOTING FLOWCHART 5-2
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I. INTRODUCTION

A. Initial Check

Check if the operating environment conforms to the following conditions.

* Line voltage is within ±10% of the rated value.
* Ambient temperature and humidity conform to the operating environment. (Refer to CHAPTER 1, I. SPECIFICATIONS)
* The scanner is not placed near a water faucet, boiler, humidifier, open flame, or in dusty place.
* The scanner is not exposed to direct sunlight. If it is inevitable to place the scanner in a sunny place, hang a curtain to shield it from direct sunlight.
* The scanner is set up in a well-ventilated place.

B. Others

When moving the scanner from a cold place to a warmer place, condensation may be formed on the metal parts. Using the scanner with condensation on the body may result in a faulty operation.

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II. TROUBLESHOOTING FLOWCHART

A. Power LED Failure

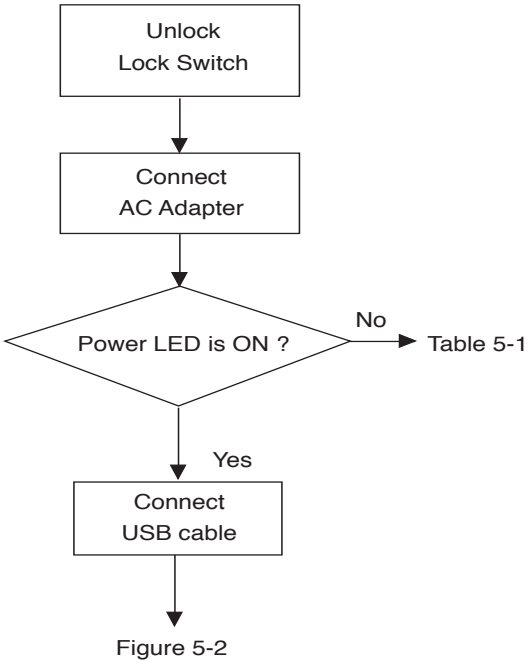

Figure 5-1

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B. Communication Failure

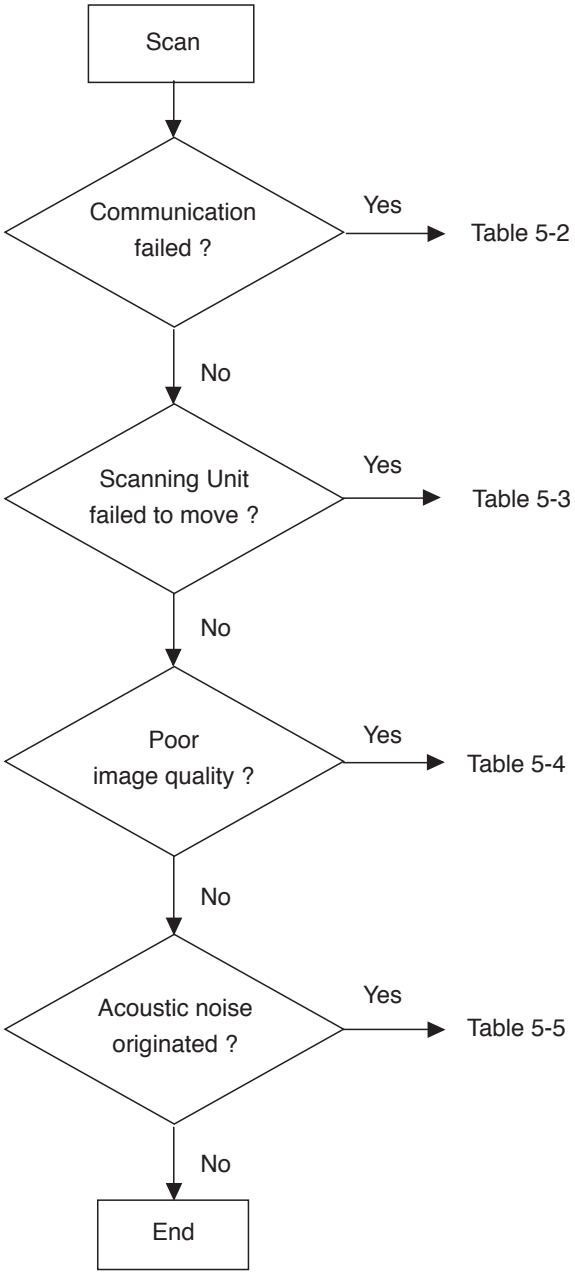

Figure 5-2

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III. PROBLEM, CAUSE AND CORRECTIVE ACTION

Defects of CanoScan 9900F may fall into one of five categories listed below:

* Power LED not lighting
* Communication failure
* Scanning unit movement failure
* Poor image quality
* Acoustic noise

A. Power LED Not Lighting

Possible Cause	Related Parts	Check Method	Corrective Action
AC adapter is unplugged from the outlet	None	Visual check	Plug the AC adapter into the outlet
AC Adapter cable is disconnected from the scanner	None	Visual check	Connect the AC adapter cable to the power connector on the scanner
AC adapter output voltage failure	AC Adapter	Output voltage (+24V) check	Replace the AC adapter
Button PCB failure	Button PCB	Tester check	Replace the button PCB
Main PCB failure	Main PCB	Tester check (+24V, GND)	Replace the main PCB
Main PCB connection failure	None	Visual check	Properly connect the main PCB

Table 5-1

B. Communication Failure

Possible Cause	Related Parts	Check Method	Corrective Action
USB cable connection failure	USB cable	Visual check	Connect the USB cable properly
Scanner communication failure	Main PCB	Trial replacement	Replace the main PCB
Scanning unit failure	Scanning unit	Trial replacement	Replace the scanning unit

Table 5-2

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C. Scanning Unit Movement Failure

Possible Cause	Related Parts	Check Method	Corrective Action
Drive belt broken or worn	Drive belt	Trial replacement	Replace the drive belt
Gears broken or worn	Pulley Unit	Trial replacement	Replace the pulley unit
Scanner button failure	Button PCB	Trial replacement	Replace the button PCB
Drive motor failure	Motor unit	Trial replacement	Replace the motor unit

Table 5-3

D. Poor Image Quality

Possible Cause	Related Parts	Check Method	Corrective Action
Scanning lamp does not light or blinks	Scanning unit	Visual check	Replace the scanning unit
Dirt on document glass	Document glass	Visual check	Clean the document glass
Main PCB failure	Main PCB	Trial replacement	Replace the main PCB
CCD PCB failure	Scanning unit	Trial replacement	Replace the scanning unit

Table 5-4

E. Acoustic Noise

Possible Cause	Related Parts	Check Method	Corrective Action
Motor unit failure	Motor unirt	Trial replacement	Replace the motor unit
Main PCB failure	Main PCB	Trial replacement	Replace the main PCB
Scanning unit failure	Scanning unit	Trial replacement	Replace the scanning unit
Dirt on sliding rod	None	Visual check	Clean the sliding rod
Reference sheet is improperly positioned	Document glass unit	Trial replacement	Replace the document glass unit

Table 5-5

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IV. CANON SCANNER TEST

A. Outline

Canon Scanner Test is a utility software to check if faulty operation of CanoScan 9900F is caused by the hardware or the communication with the host computer.

Windows : scantest.exe (Use of an English version or a Japanese version is determined by the Windows.)
Macintosh : chk9900e (English)
chk9900j (Japanese)

B. Operating Environment

The Canon Scanner Test requires following environment:

Windows platform
* CanoScan 9900F
* PC/AT Compatibles (Pentium or later)
* Windows 98/Me/2000/XP OS
* CanoScan 9900F Device Driver

Macintosh platform
* CanoScan 9900F
* Power Macintosh
* Macintosh OS (Version 9.0 - 9.2)
* CanoScan 9900F Device Driver

Note: Install CanoScan 9900F device driver before the Canon Scanner Test.

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C. Functions

1. USB Information (Windows only)

Information of the scanner connected to the USB port on the PC is displayed. If communication between the scanner and the host computer fails, no information will be displayed.

2. Scanner Information

Control program of CanoScan 9900F connected to the PC is displayed. If communication between the scanner and the host computer fails, no information will be displayed.

3. Scanner Self Test

CanoScan 9900F self test is executed.

4. Scan

An image is scanned at any resolution and saved as an image file in the folder of Canon Scanner Test.

5. Film Scan

Scann 35mm sleeve negative film by FAU lamp and scann it by IR LED with FARE function. Save the two scanned images files in the folder of Canon Scanner Test. Scann one frame at upper right in the sleeve film holder with resolution fixed at 1600dpi.

Note: Calibration cannnot be used with CanoScan 9900F. (Calibration function is in light gray and unable to click it.)

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D. Functions Descriptions

1. USB Information (Windows only)

Select “USB Information” from the “Function” menu. The window shown in Figure 5-3 will appear.

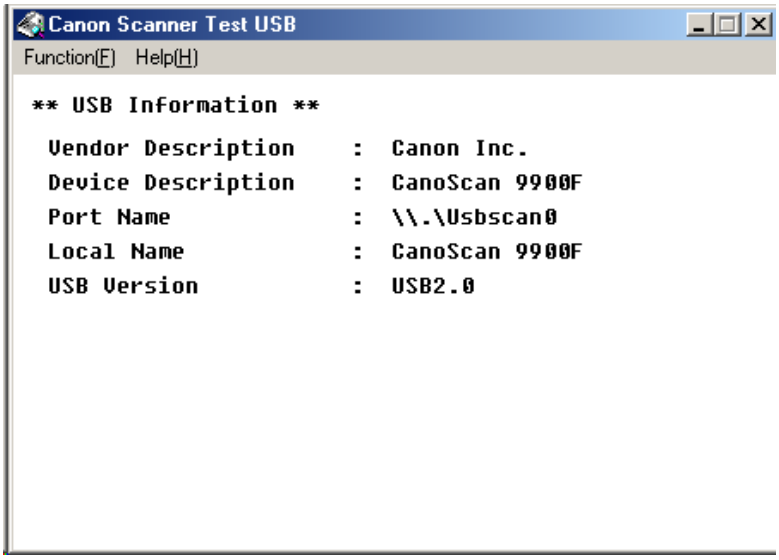
Canon Scanner Test USB
Function(F) Help(H)
** USB Information **
Vendor Description : Canon Inc.
Device Description : CanoScan 9900F
Port Name : \\.\Usbscan0
Local Name : CanoScan 9900F
USB Version : USB2.0

Figure 5-3

* Vendor Description : Manufacture of the scanner, "Canon Inc."
* Device Description : Product name, "CanoScan 9900F"
* Port Name : Port name of the scanner recognized by Windows
* Local Name : Product name, "CanoScan 9900F"
* USB Version : USB version (USB1.1/USB2.0) that the scanner is operating with.

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2. Scanner Information

Select “Scanner information” from the “Function” menu The window shown in Figure 5-4 (Windows) or Figure 5-5 (Macintoch) will appear.

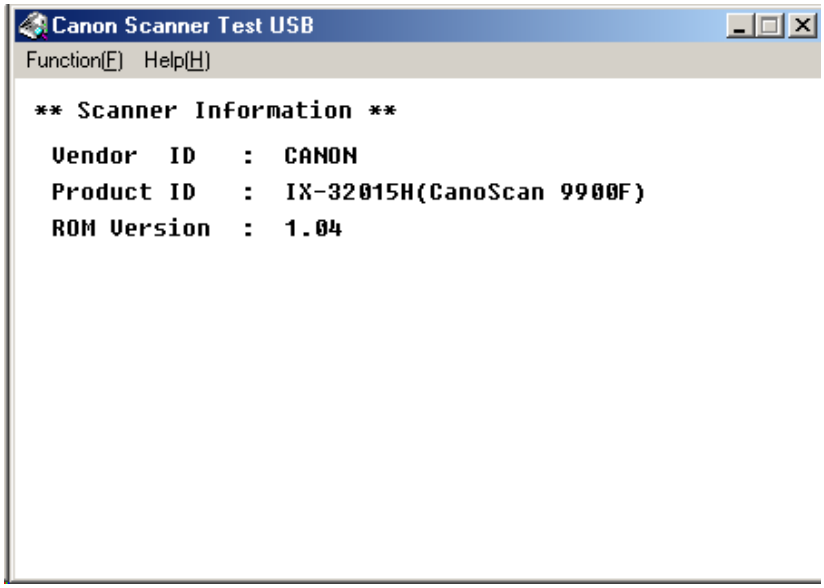

Figure 5-4

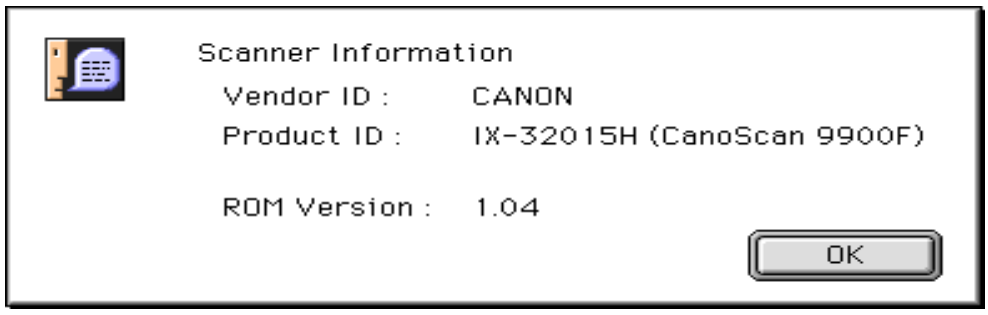

Figure 5-5

* Vendor ID : Manufacturer name of the scanner "CANON"
* Product ID : "IX-32015H"(CanoScan 9900F)
* ROM Version : Firmware version of the control program of the scanner

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4. Scan

Select "Scan" from the "Function" menu. The window shown in Figure 5-6 (Window) or Figure 5-7 (Macintosh) will appear.

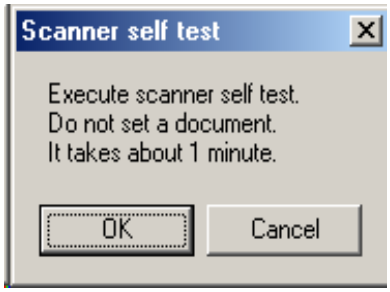

Figure 5-6

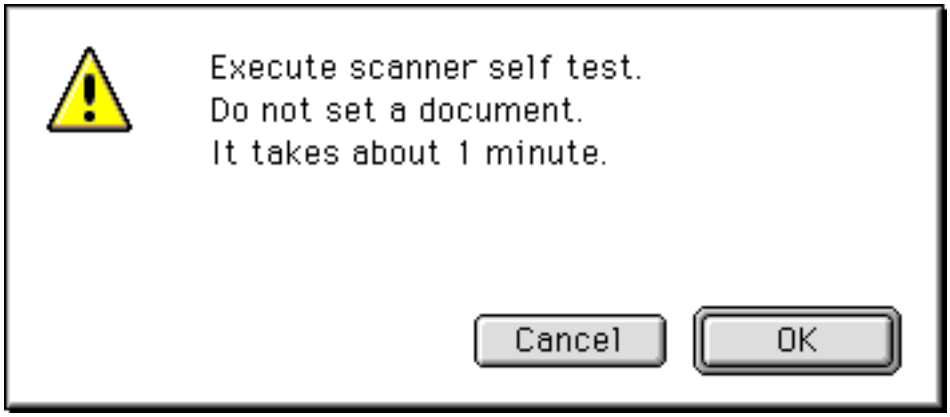

Figure 5-7

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Click "OK" to start scanner selftest. When completed normally, a dialog box shown in Figure 5-8 (Windows) or Figure 5-9 (Macintosh) will appear.

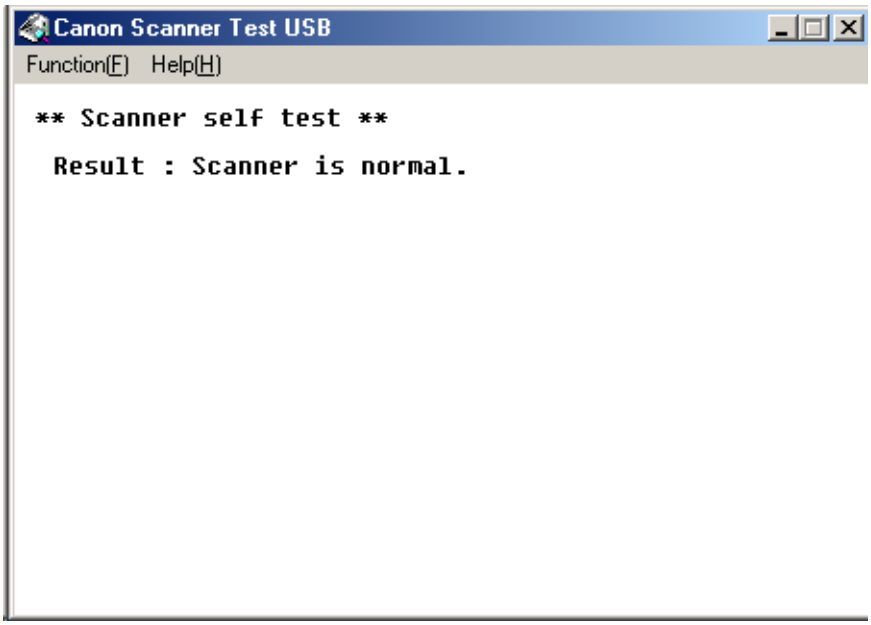

Figure 5-8

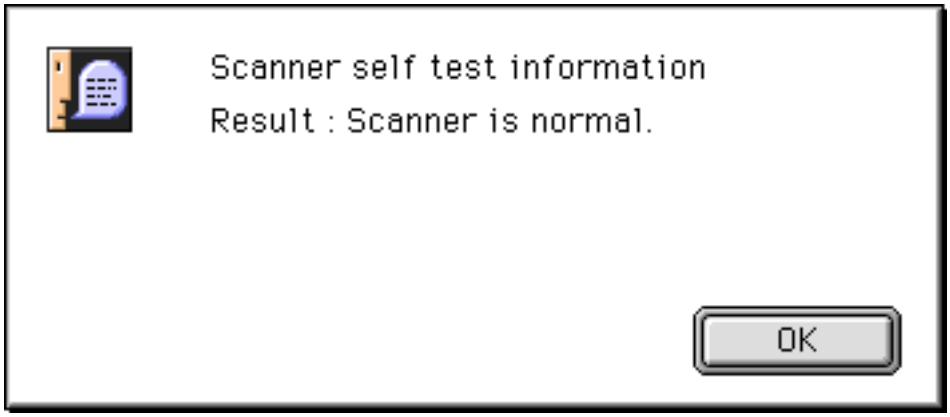

Figure 5-9

When an error occurs, refer to "E. Error Message" to take a corrective action.

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4. Scanning Original

Select “Scan” from the “Function” menu. The display will be either Figure 5-10 (Windows) or Figure 5-11 (Macintosh).

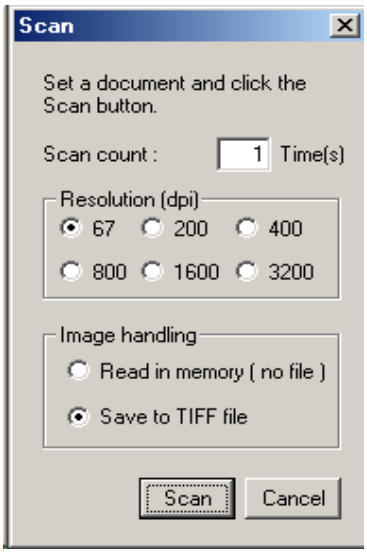

Figure 5-10

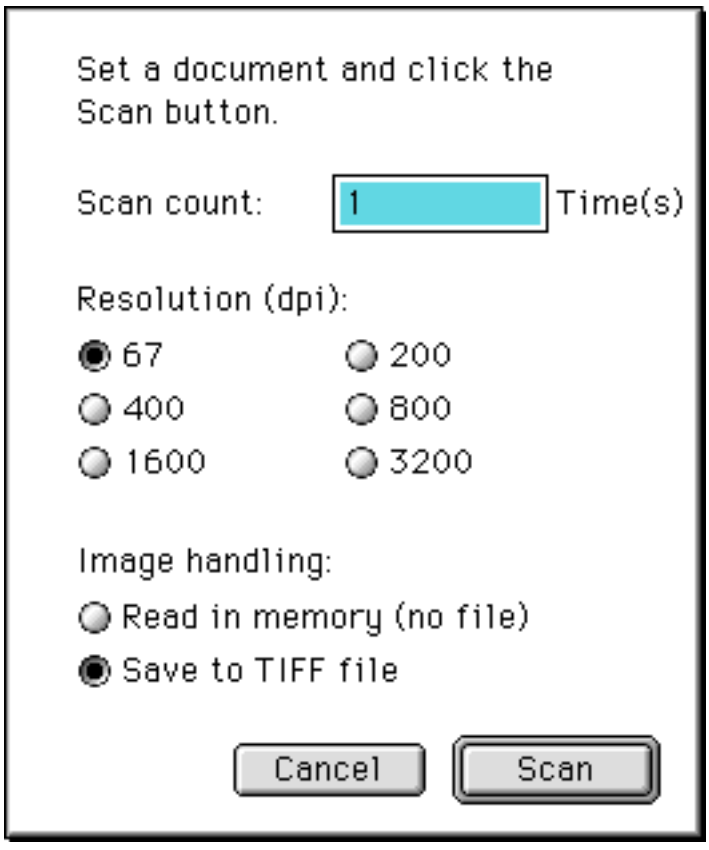

Figure 5-11

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* Scan count
  Set the number to be scanned ranging from 1 to 100.

* Resolution (dpi)
  When the resolution for scanning an image is set at 67/200/400dpi, the entire area of the document glass is scanned. When set at 800/1600/3200dpi, the are of 5mm in width from the reference sheet of the document glass is scanned.

* Image handling
  When "Read in memory (no file)" is selected, the image is read into the memory and be destroyed.
  When "Save to TIFF file" is selected, the image is stored in the file called "img0.tif" in the folder of the Canon Scanner Test.
  When scan count is set at 2 or larger number, the scanned images are saved in more than one file including "img0.tif" file, "img1.tif" file , and "img2.tif" file.

File space to be saved is as follow:
67 dpi : 1.3MB, 200 dpi : 11.2 MB, 400 dpi : 44.9 MB
800 dpi : 2.4 MB, 1600 dpi : 9.7 MB, 3200 dpi : 29.3 MB

Note : Make sure that there are more disk space on HDD with Canon Scanner Test installed than ones specified above before scanning.

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5. Film Scan

Select “Film Scan” from the “Function” menu. The window shown in Figure 5-12 (Windows) or Figure 5-13 (Macintosh) will appear.

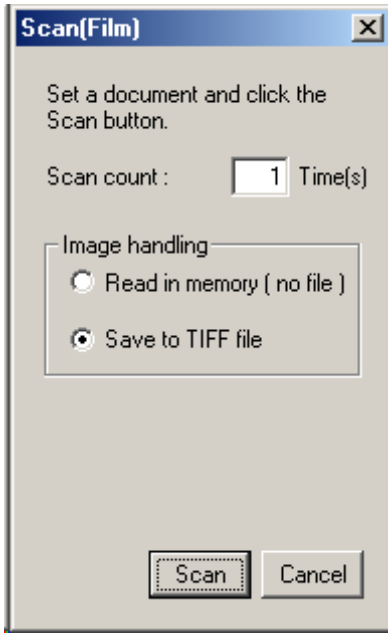

Figure 5-12

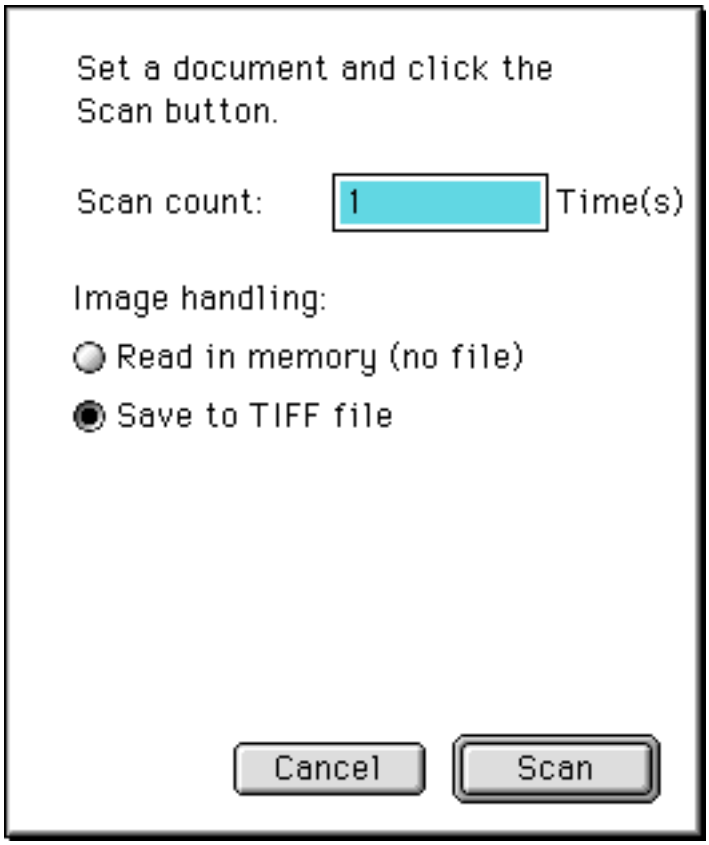

Figure 5-13

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Only an upper right frame of the 35mm sleeve film guide can be scanned (the first frame shown in Figure 5-14.)

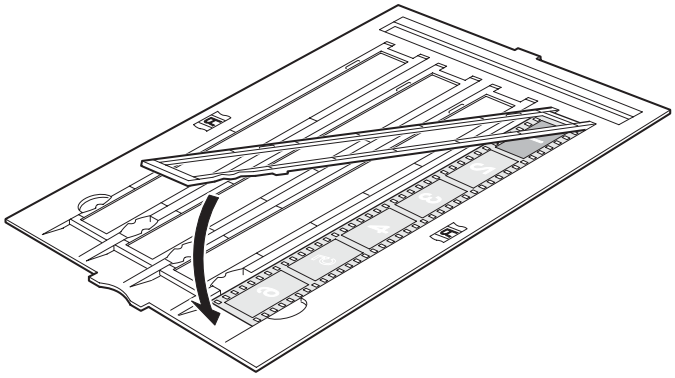

Figure 5-14

* Scan count
Set a number to be scanned ranging from 1 to 100. When 2 or larger number is set and "Save to TIFF file" is selected, only a file of specified scanning is saved.

* Image handling
When “Read in memory (no file)” is selected, the image is read into the memory and be destroyed.
When “Save to TIFF file” is selected, an image file scanned by FAU lamp and and an image file scanned by IR LED are saved. The images scanned by FAU lamp is stored in "Color24_0.tif" file, and the image scanned by IR LED is stored in "IR_0.tif" file. Both files are included in the folder of the Canon Scanner Test.
IR.tif is an infrared image scanned with FARE function working. If FARE function works normally, only dirt or dust on the film will be scanned as an image. If FARE function does not work well, IR.tif image will be all in black.
When scan count is set at 2 or larger number, the scanned images are saved in more than one file including Color24_0.tif/IR_0.tif, Color24_1. and tif/IR_1.tif.

File space to be saved is as follow.
Color24_0.tif (1600 dpi) : 10 MB, IR_0.tif (1600 dpi) : 3.3 MB

Note: When scanning a film, the color of the scanned image may appear lighter than that of the original film. This is because the image is not subjec to the image processing yet.

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E. Error Message

1. "Unable to find the scanner. Check if the cables are connected properly."
Cause : Scanner is not detected by the host computer.
Corrective Action : Refer to the "II. Troubleshooting Flowchart".

2. "Failed to read scanner information."
Cause : Scanner is not detected by the host computer.
Corrective Action : Refer to the "II. Troubleshooting Flowchart".

3. "Failed to create a file." "Failed to open a file." "Failed to close a file." "Failed to write-in a file."
Cause : Canon Scanner Test is started from a CD-ROM or write-protected HDD.
Corrective Action : Copy the Canon Scanner Test on a writable HDD to use.

4. "Scanner has problem." "Failed to execute scanner self test."
Cause : Scanner is not recognized by the host computer.
Corrective Action : Refer to the "II. Troubleshooting Flowchart".

5. "Failed to allocate memory."
Cause : Scanner is not recognized by the host computer.
Corrective Action : Refer to the "II. Troubleshooting Flowchart".

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